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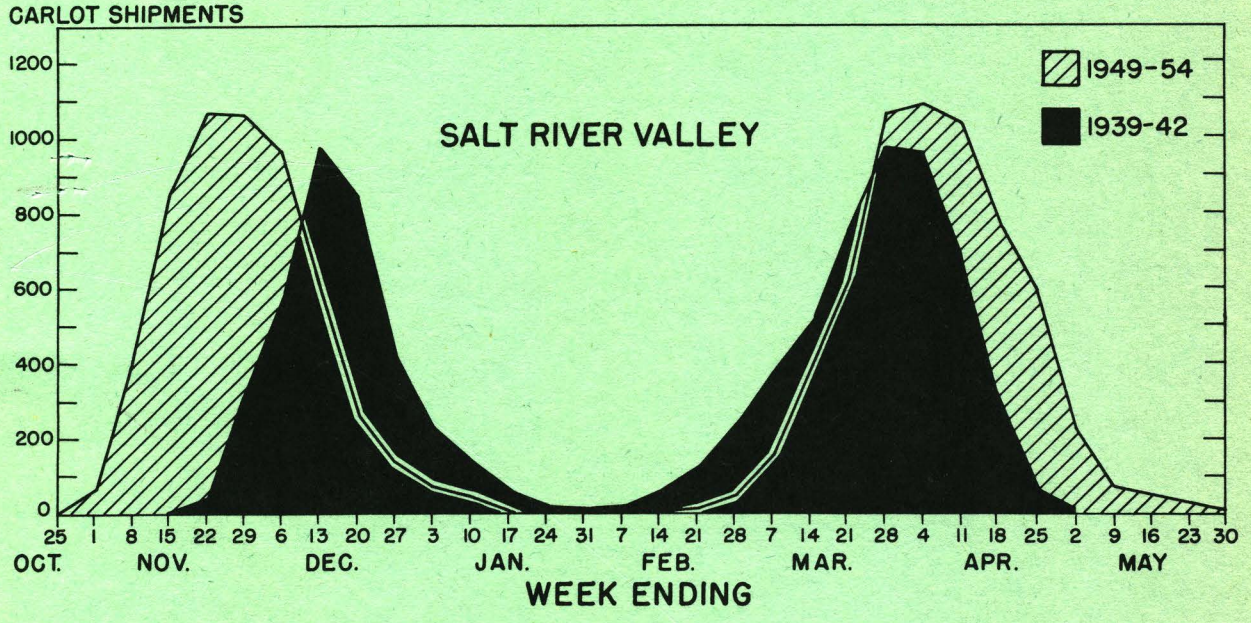
SEASONAL AND INTER-AREA SHIFTS IN THE WESTERN LETTUCE INDUSTRY



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SUMMARY AND CONCLUSIONS

1. Lettuce production in the States of Arizona and California and the shipment of lettuce from these States has dominated the United States market for the past 25 years. These States, in an average year, produce over 80 per cent of the lettuce grown for market and ship 90 per cent or more of the United States commercial carlot shipments.

2. Lettuce shipments from the six major districts increased 56.3 per cent between the time periods 1937-38 to 1941-42 and 1949-50 to 1953-54 from an average 881 cars per week to an average 1,377 cars. Although lettuce production and shipments have increased significantly in Arizona and California, their relative share of the United States market has remained stable.

3. Significant shifts have occurred in the Western lettuce industry since World War II. These shifts have been of three types:

   a. Seasonal shifts within specific areas of production.

   b. Shifts between the major producing districts as to the portion of the total lettuce crop shipped, and as to seasonal planting, harvesting, and shipping dates.

   c. Shifts to new areas of production.

4. There seems to have been an increasing tendency during recent years for the lettuce deals in the major districts to overlap. One of the principal causes of this has been the introduction of new varieties which will withstand both warmer and cooler temperatures.

5. The periods of intense competition in the industry appear to occur during the mid-November to mid-December period and during the mid-March to mid-April period. These are periods when several districts are involved in shipping lettuce, and it is during these periods that increasing competition from new areas such as Texas and Blythe is likely to be most serious.

6. The most noticeable shift in the lettuce industry during the period under study was the shift of Salinas out of November and early December, which has been associated with the movement of the Salt River Fall peak forward by from three to four weeks. In the month of November during the 1949-50 to 1953-54 (second) period, the Salinas district shipped on the average only 1,840 cars and 31.6 per cent of the United States lettuce, whereas in the 1937-38 to 1941-42 (first) period, it had shipped on the average 3,329 cars and 81.4 per cent of the lettuce. The Salt River district, on the other hand, shipped on the average 3,118 cars in November of the second period. This was 53.5 per cent of all lettuce shipped, and represented an increase from an average of only 268 cars (6.6 per cent of total shipments) in the first period. This

significant shift had interrelated effects in other districts such as Yuma and Imperial, and in other time periods such as December shipments from all these districts.

7. The shift described in No. 6 above is further clarified by the crossing dates, the dates when shipments from an area coming into production exceed those of one going out. This date for the Salinas-Salt River Fall deals has moved from November 30 in the 1937-38 season to November 7 in the 1954-55 season, or an average of one and one-half days per year.

8. Other significant shifts in the Western lettuce industry are as follows:

   a. The shift and growth of Yuma in the late Fall-early Winter period.

   b. The movement of the Imperial, Yuma, and Texas deals into completely dominating positions during the period mid-December to mid-March.

   c. The increasing relative share of the market taken by the Salt River district in the Spring, even though the number of cars shipped from Salinas has remained stable.

9. The growth of Texas shipments is important, and when truck shipments are considered, it is evident that Texas is bidding for a larger share of the market.

10. The Blythe district of Southern California is offering the most serious competition of any new district. In the future, it will probably have a vital effect on the Yuma and Salt River Spring lettuce shipments.

11. The statistical tests used indicated that there is no reason to believe that competition is more intense around the crossing dates of the major districts than at other dates when these districts are competing.

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SEASONAL AND INTER-AREA SHIFTS IN THE WESTERN LETTUCE INDUSTRY

J. S. Hillman[1]/

Each year for the past 25 years the states of Arizona and California have produced more than three-fourths of the commercial lettuce in the United States. Production in these two states during this period ranged as high as 87 per cent of United States marketings in 1939, and has remained relatively stable about an annual average of 83 per cent. In 1954 these states produced 78 per cent of all commercial lettuce. This is the lowest percentage since 1930 when 80 per cent was produced, and may be attributable to a combination of factors such as weather, prices, and improved varieties, which made possible higher production in Texas and other areas.

Since 1930 there has been an increase of a little over 100 per cent in production of lettuce in Arizona and California. Generally speaking, however, there has been no noticeable trend in the proportion of total United States production coming from these states. While there has been a sharp increase in lettuce production in these two states, production in other areas has kept pace with this increase. Table 1 shows the relative importance of Arizona and California in the production of lettuce in the United States since 1930.

The data above relate only to lettuce production. The dominant position of these states in the marketing of lettuce is even more evident when carlot shipment figures are examined. Since 1934 over 90 per cent of the carlot shipments have originated in these states. In many years since World War II they have accounted for more than 95 per cent of the shipments. The fact that increasing amounts are being grown locally or marketed by truck, and are not reflected in carlot shipments, does not alter the fact that Arizona and California have consistently maintained their positions as the leading producers and shippers of lettuce. Table 2 contains statistics on carlot shipments of lettuce from California and Arizona since 1930, and the percentage that each is of total United States carlot shipments.

METHOD OF ANALYSIS

Objectives

Lettuce is produced and harvested in various sections of the United States during all seasons of the year. Since the end of World War II, there have occurred significant changes in methods of producing, harvesting, and packaging this crop; changes that have resulted in shifts in seasonal and inter-area patterns of marketings. These changing relationships are of great importance to the lettuce industry, where timing of plantings and marketings may appreciably affect ultimate returns. Consequently, producers and distributors have become more concerned about these and other factors affecting their competitive positions in the industry.

It has already been pointed out that the over-all trend in commercial lettuce production and shipments has been steadily upward, while the relative amounts produced and shipped from Arizona and California have remained relatively stable. Yet, within the over-all western lettuce industry several significant shifts have occurred. These shifts have been of three particular types: (1) shifts within specific producing districts as to planting and harvesting dates; (2) shifts between the major districts as to the relative amounts of lettuce

1/Associate Agricultural Economist, University of Arizona. Acknowledgment is made of the assistance of R. S. McGlothlin and R. E. Seltzer in the planning and editing of this report. Appreciation is also expressed to O'Dean Hubbard and Charles Powell for their assistance in making the calculations on which this study is based.

Table No. 1- Commercial lettuce production in the United States, Arizona, and California. 1930-1954.

Year	United States	Arizona	Per cent Arizona is of U.S.	California	Per cent Calif. is of U.S.	Per cent Ariz. and Calif. are of U.S.
	(1000 crates)	(1000 crates		(1000 crates)		
1930	19,820	2,798	14.1	13,055	65.9	80.0
1931	19,344	2,601	13.4	13,019	67.3	80.7
1932	17,855	2,401	13.5	11,892	66.6	80.1
1933	17,830	2,460	14.1	11,538	66.4	80.5
1934	19,106	2,169	11.4	13,380	70.0	81.4
1935	19,253	3,815	19.8	12,292	63.9	83.7
1936	21,104	4,197	19.9	14,031	66.5	86.4
1937	20,740	4,441	21.4	13,526	65.2	86.6
1938	19,195	3,914	20.4	12,595	65.6	86.0
1939	24,367	4,756	19.5	16,429	67.4	86.9
1940	22,287	4,260	19.1	14,306	64.2	83.3
1941	23,754	5,303	22.3	15,011	63.2	85.5
1942	23,928	5,317	22.2	15,186	63.5	85.7
1943	25,768	5,699	22.1	16,290	63.2	85.3
1944	29,079	6,383	22.0	18,670	64.2	86.2
1945	30,065	6,349	21.1	19,207	63.9	85.0
1946	34,070	6,775	19.9	22,167	65.0	84.9
1947	34,766	7,337	21.1	22,526	64.8	85.9
1948	34,676	6,869	19.8	22,200	64.0	83.8
1949	34,813	7,073	20.3	21,602	62.1	82.4
1950	37,966	7,271	19.2	23,442	61.7	80.9
1951	36,231	7,884	21.7	21,871	60.4	82.1
1952	39,912	7,154	17.9	25,116	62.9	80.8
1953	40,095	6,786	16.9	25,490	63.6	80.5
1954	40,492	6,527	16.1	25,212	62.3	78.4

Table No. 2- Carlot shipments of lettuce for the United States, Arizona, and California, 1930-1954.

Year	United States	Arizona	Per cent Arizona is of U.S.	California	Per cent Calif. is of U.S.	Per cent Ariz. and Calif. are of U.S.
	cars	cars		cars		
1930	55,628	9,575	17.2	37,450	67.3	84.5
1931	49,890	6,148	12.3	35,643	71.4	83.7
1932	46,681	8,203	17.6	32.915	70.5	88.1
1933	42,761	6,646	15.5	31,324	73.3	88.8
1934	44,164	6,060	13.7	34.094	77.2	90.9
1935	46,999	12,354	26.3	31,502	67.0	93.3
1936	49,974	11,717	23.5	35,603	71.2	94.7
1937	51,295	12,804	25.0	35,589	69.4	94.4
1938	43,475	10,766	24.8	29,844	68.7	93.5
1939	52,416	11,183	21.3	37,943	72.4	93.7
1940	49,898	11,846	23.7	34,116	68.4	92.1
1941	55,626	15,032	27.0	37,254	67.0	94.0
1942	56.227	15,102	26.9	38.006	67.6	94.5
1943	58,109	15,343	26.4	38,620	66.5	92.9
1944	66,985	17,245	25.7	45,828	68.4	94.1
1945	68,471	15,829	23.1	47,651	69.6	92.7
1946	74,703	18,516	24.8	51,136	68.5	93.3
1947	76,941	18,806	24.4	53,895	70.1	94.5
1948	74,119	18,014	24.3	53,324	71.9	96.2
1949	70,968	17,953	25.3	49,660	70.0	95.3
1950	75,247	18,909	25.1	53,030	70.5	95.6
1951	68,123	17,641	25.9	47,569	69.8	95.7
1952	78,250	17,540	22.4	56,147	71.8	94.2
1953	79,472	17,720	22.3	57,705	72.6	94.9
1954	77,254	16,890	21.8	55,558	71.9	93.7

shipped, with respect both to seasonal shipments and to total annual shipments; and (3) shifts to new areas of production. The principal objective of this analysis is to measure graphically and statistically the nature and extent of these shifts and the resulting changes in competitive relationships between districts.

This study will not attempt to utilize price data to measure competitive relationships. It will be assumed here that price differentials, of themselves, played little part in the shifts that took place. It will also be assumed that other price-related items such as transportation costs played a relatively small role in all the major shifts, with the possible exception of Texas production.2/

Major Districts Included

The commercial lettuce industry may be classified by seasonality of production or by geographic area. For the most part, these classifications tend to be the same because particular areas are identified by the season in which lettuce shipments from those areas predominate. As stated above, a few combined areas in Arizona and California ship the major portions of the country's lettuce. In any given season, there is an area in one of these two states which is shipping a large share of the available United States lettuce.

The shifts outlined above will be considered for six areas: (1) the Salt River Valley; (2) the Yuma Valley; (3) the Imperial Valley; (4) the Salinas-Watsonville-Hollister area; (5) the district known as Southern California (excluding Imperial); and (6) the lettuce producing areas of Texas. In each of the years covered by this study 90 per cent or more of all carlot shipments of lettuce in the United States originated from these districts.

Time Periods Covered

With respect to the shifts in the lettuce industry, it was deemed important to discover when they occurred as well as where they occurred. It was recognized that, while shifts have been evident, they have not appeared abruptly from year to year. Sometimes it has taken several years for the comparative advantage of one area or season to manifest its superiority over another. Hence, periods longer than one or two crop seasons were needed for comparative purposes to measure the shifts.

The problem of what time period to use was taken up with producers and distributors in the lettuce industry, and with other persons interested in the industry. These discussions, along with observation of statistics on lettuce production and marketing, prompted a decision to utilize periods of five years' duration before and after World War II -- but excluding the war years -- for comparative purposes.

A five-year period, it was decided, provides sufficient time for representing average relationships and a period long enough so that averages are not seriously affected by single season abnormalities. Five years, at the same time, is a sufficiently long period to permit real shifts in production and distribution to take place. For example, if an abnormal weather condition affects the planting or harvesting date in a particular district and season, or if some production or harvesting innovation occurs, the five-year period will reflect these conditions in a more realistic manner than will a shorter period. On the other hand, if the periods used for comparison are too long, some of the more significant aspects of the shifts may not be evident.

The two five-year periods, 1937-38 to 1941-42 and 1949-50 to 1953-54, were selected for this study. Data were compiled by weeks for the crop year beginning October 25. With respect to the Salinas and Texas districts, weekly data were used for the period October 25, 1937, through October 17, 1942, in order to facilitate comparison with the other four districts, the crop years for which begin in the Fall.

2/Research now under way at the University of Arizona will study the problem of price relationships in the Western lettuce industry.

Table No.3- Average weekly carlot shipments of lettuce from the major districts, 1937-38 to 1941-42 as compared to 1949-50 to 1953-54.

DATE	SALINAS			SALT RIVER (fall)			SALT RIVER (spring)			IMPERIAL			YUMA			TEXAS			SO. CALIF.			TOTAL MAJOR DISTRICTS	
Week including	1st Period	2nd Period	Col.2 minus Col.1	1st Period	2nd Period	Col.5 minus Col.4	1st Period	2nd Period	Col.8 minus Col.7	1st Period	2nd Period	Col.11 minus Col.10	1st Period	2nd Period	Col.14 minus Col.13	1st Period	2nd Period	Col.17 minus Col.16	1st Period	2nd Period	Col.20 minus Col.19	First Period	Second Period
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)		
Oct. 25	677	961	284	-	3	3											202	202				677	1166
Nov. 1	736	1025	289	-	67	67											141	141		2	2	736	1235
8	870	708	- 162	-	416	416											72	72		7	7	870	1203
15	938	315	- 623	1	852	851				-	4	4	-	5	5		49	49		19	19	939	1244
22	732	108	- 624	44	1073	1029				-	4	4	-	59	59		31	31		45	45	776	1320
29	397	48	- 349	320	1066	746				-	38	38	4	222	218		47	47		85	85	721	1506
Dec. 6	140	8	- 132	571	966	395				15	179	164	46	317	271		75	75		84	84	772	1629
13	21	3	- 18	982	598	- 384				61	342	281	108	307	199		104	104		68	68	1172	1122
20	1	-	- 1	846	261	- 585				130	512	382	142	233	89		108	108		49	49	1119	1163
27				425	134	- 291				260	625	365	179	205	26		158	158		44	44	864	1166
Jan. 3				226	73	- 153				490	800	310	232	240	8		166	166		43	43	948	1322
10				135	39	- 96				751	1108	357	221	277	56		188	188		36	36	1107	1648
17				54	4	- 50				899	985	86	196	233	37		211	211		20	20	1149	1453
24				18	1	- 17				922	1163	241	144	236	92		171	171		18	18	1084	1589
31				11	3	- 8				903	1185	282	133	197	64		115	115		8	8	1047	1508
Feb. 7							12	2	- 10	921	1283	362	148	259	111		70	70		10	10	1081	1624
14							53	1	- 52	818	1291	473	271	286	15		45	45		11	11	1142	1634
21							120	7	- 113	610	1109	499	334	328	- 6		25	25		11	11	1064	1480
28							239	47	- 192	431	967	536	337	412	75		17	17		32	32	1007	1475
Mar. 7							379	162	- 217	313	749	436	401	482	81		30	30		78	78	1093	1501
14							502	391	- 111	153	490	337	436	512	76		42	42		127	127	1091	1562
21							759	631	- 128	77	207	130	356	478	122		50	50		168	168	1192	1534
28	4	3	- 1				980	1072	92	14	59	45	167	288	121		55	55		15	15	1165	1492
Apr. 4	61	29	- 32				963	1096	133	-	17	17	41	145	104		73	73		86	86	1065	1446
11	276	299	- 23				618	1046	428	-	3	3	1	29	28		51	51		39	39	895	1467
18	755	743	- 12				269	777	508								24	24		42	42	1024	1586
25	1155	1088	- 67				59	592	533								8	8		27	27	1214	1715
May 2	1436	1448	12				14	226	212								10	10		27	27	1450	1711
9	1284	1814	530				-	70	70								12	12		30	30	1284	1926
16	935	1602	667				-	52	52								5	5		20	20	935	1679
23	743	1588	845				-	27	27											8	8	743	1623
30	488	1253	765				-	11	11											3	3	488	1267
June 6	435	1238	803				-	8	8											1	1	435	1247
13	428	1069	641				-	8	8													428	1077
20	541	990	449				-	2	2													541	992
27	547	1104	557																			547	1104
July 4	590	1226	636																			590	1226
11	769	1357	588																			769	1357
18	772	1243	471																			772	1243
25	854	1226	372																			854	1226
Aug. 1	871	1158	287																			871	1158
8	770	1039	269																			770	1039
15	666	1150	484																			666	1150
22	732	1187	455																			732	1187
29	843	1227	384																			843	1229
Sept. 5	805	1410	605														2	2				805	1416
12	817	1293	476														6	6				817	1298
19	760	1130	370														5	5				760	1156
26	761	1125	364														26	26				761	1154
Oct. 3	696	1193	497														29	29				696	1239
10	633	1265	632														46	46				633	1400
17	620	1193	573														135	135				620	1408
																	215	215					
Total cars shipped	25,559	36,866		3633	5556		4967	6228		7768	13,120		3897	5750			2819			1263		45,824	71,602
Per cent increase in cars shipped 2nd period over 1st period			44.2			52.9			25.4			68.9			47.5								56.3
Average number cars shipped per week *	726.3	1115.8		500.7	670.7		536.6	665.9		584.7	812.2		237.8	297.7			159.5			147.5		881.2	1377.0
Average increase per week in cars shipped 2nd period over 1st *		389.5			170.0			129.3			227.6			59.9									495.8

NONE SHIPPED DURING FIRST PERIOD

NONE SHIPPED DURING FIRST PERIOD

* Only those weeks included in which one hundred (100) or more cars were shipped.

The period 1949-50 to 1953-54 was used for several reasons. First, beginning about 1949, the effects of the new Great Lakes variety became felt in the industry. This allows a full five-year period in which its possible effects on production conditions could be observed. Second, this period includes those years in which production in Texas and Southern California has risen to sizeable proportions. Finally, this period was marked by significant technological changes in packaging and cooling which have resulted in adjustments in geographic and seasonal patterns of shipments.

In the text that follows, when these periods are under discussion, the period 1937-38 to 1941-42 will be designated as the first period and the period 1949-50 to 1953-54 as the second period.

Weekly Data on Carlot Shipments Used

Weekly data on carlot shipments of lettuce from the major districts were utilized for comparison in most instances. Daily shipments fluctuate too widely to be effectively compared, whereas monthly data would not reflect the changing seasonal patterns of shipment that have taken place.

Carlot shipments present a useful tool by which the shifts and trends in the industry may be measured. Complete data are available by districts, and the major portion of the Western lettuce crop is still transported by rail. Moreover, it is believed that carlot shipments reflect commercial production of lettuce adequately because only a small fraction of the lettuce produced in the major districts is consumed locally.

The principal weakness of this exclusive use of shipment data from the major districts is that shipments during the warm weather months from areas other than these districts are not included. This is not particularly serious, however, because of the extent to which Central California dominates the commercial market during the summer months. No commercial lettuce of any consequence is produced or shipped from other than the major districts during the other seasons. Another weakness, which is primarily one of degree, derives from the exclusion of truck shipments in the comparisons.

EXPANSION OF LETTUCE SHIPMENTS

One of the most noticeable characteristics of the lettuce industry during the years under study was the general increase in shipments. Total shipments from all districts increased from an average 881 cars per week during the first period to 1377 cars per week during the second period. This is an average weekly increase of nearly 500 cars, or 56.3 per cent (Table 3).

Figure 1 shows how the average weekly shipments of lettuce were distributed throughout the year or the two periods. In order to ascertain when the increases and decreases occurred, and in what volume, the first period was used as a base from which deviations were measured. These deviations are shown in Table 5.

It is evident that the greatest increases in shipments occurred during the interval mid-May to mid-July. In fact, for seven weeks during this interval the average increase of the second period over the first period was more than 600 cars of lettuce per week. Certain other periods, such as mid-October, late November, and early December, showed more than average gains.

In no week were the shipments in the second period less than those of the first period. However, as Table 5 shows, the four weeks centered around Christmas and New Years are all far below the average increase.

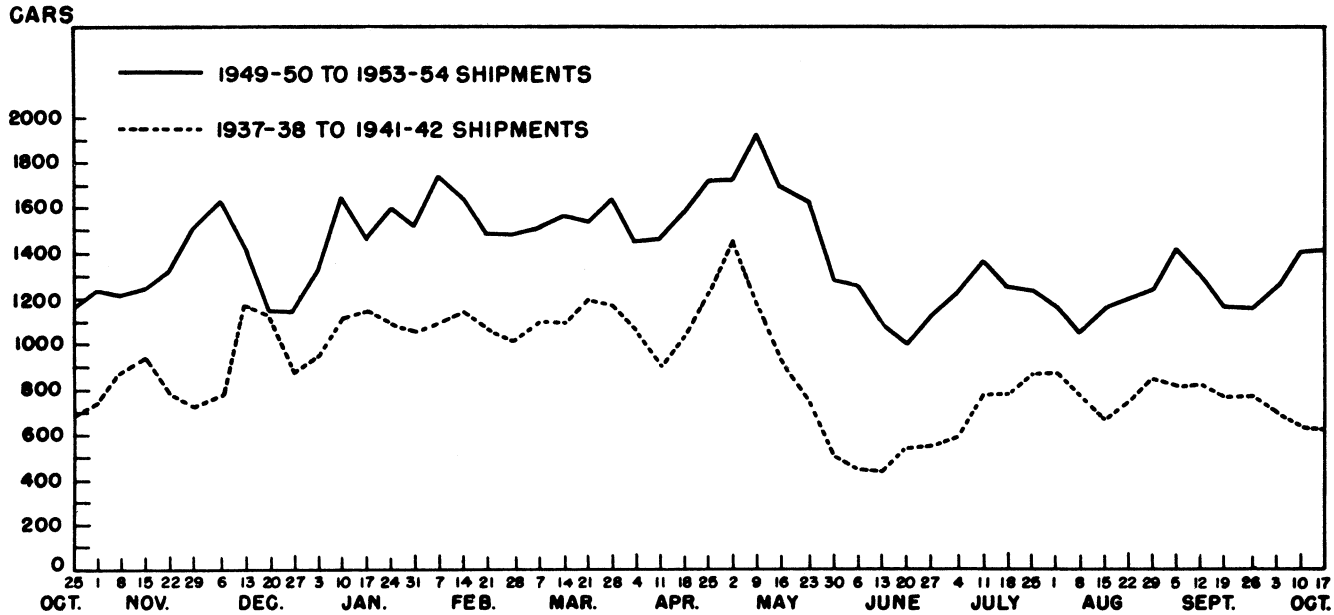
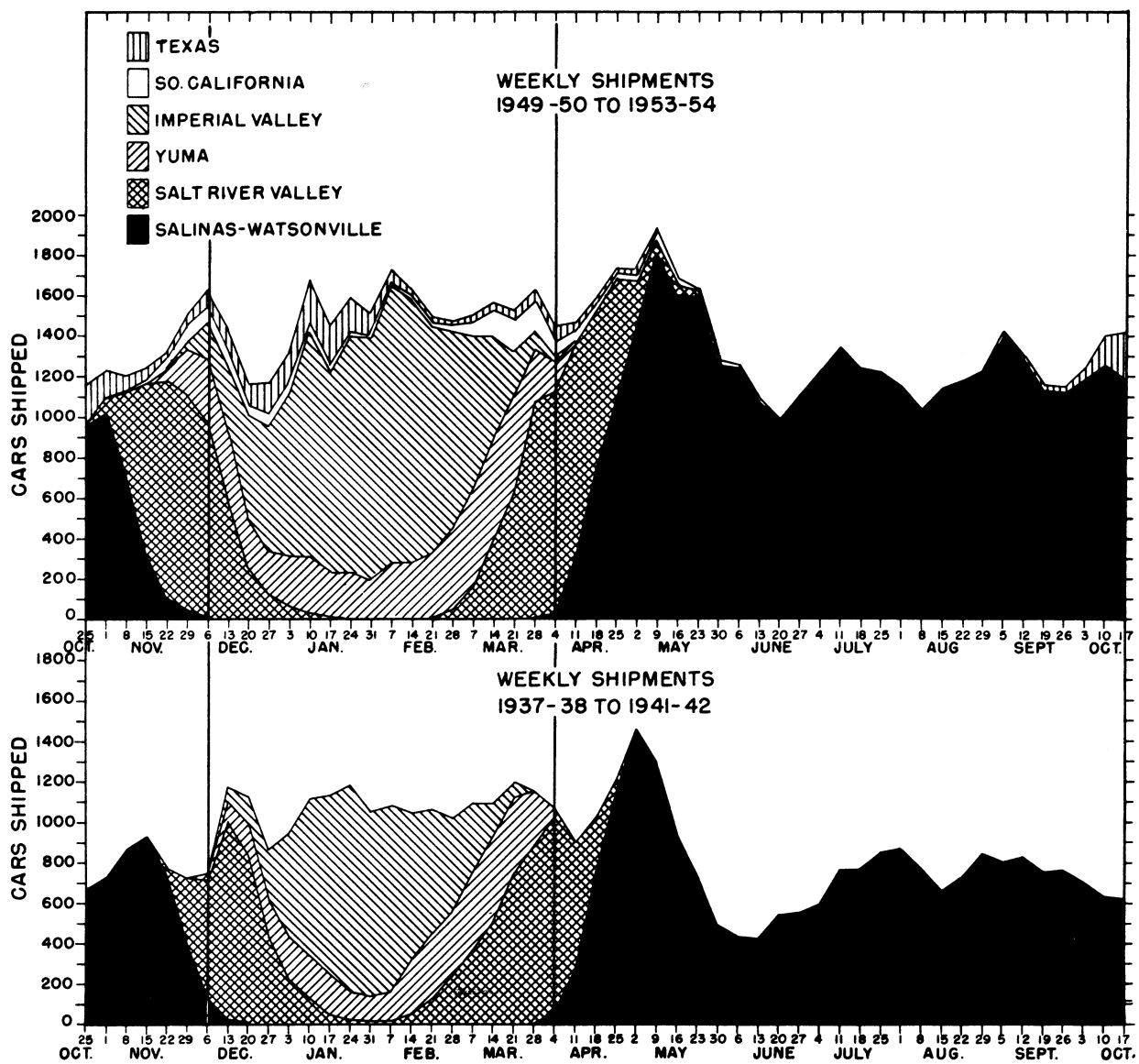


Figure 1.- Weekly carlot shipments of lettuce from major districts, 1937-38 to 1941-42 & 1949-50 to 1953-54



COMPOSITION OF WEEKLY CARLOT SHIPMENTS OF LETTUCE DURING THE PERIODS
1937-38 TO 1941-42 AND 1949-50 TO 1953-54
Figure 2.

ORIGIN OF SHIPMENTS

In general, there has been a noticeable change in the origins of lettuce shipments during the months October through May (Figure 2). The volume of shipments by the Salt River, Yuma, and Texas districts before the first week in December has increased significantly from the first period. The Imperial and Southern California districts have also increased shipments in this period. It can also be seen that the Salt River district is shipping more lettuce in April and May than in the corresponding months of the first period. A large part of these Fall and Spring gains have affected shipments from the Salinas-Watsonville district. Tables 4 and 5 present these changes in tabular form.

INCREASED OVERLAPPING

There seems to have been an increasing tendency during recent years for the lettuce deals in the major districts to overlap. In order to get some indication of how serious this problem has been the dates of the first and last carlot shipment from each district were secured back as far as the 1935-36 season. For Texas and Southern California these dates were available beginning with the 1949-50 season. It is evident that during the Fall and Spring months, overlapping seems to have become more serious since World War II than it was during the late nineteen thirties (Figure 3).

The question arises as to whether first and last car shipments are truly representative of the tendency to overlap. Many times there are factors such as weather which advance or delay the main volume of shipments once a deal is underway and which may, in turn, distort the situation shown in Table 2. The first car may be shipped from an area quite a number of days prior to large volume shipments. Likewise, an area may continue to harvest a few cars long after the bulk of the lettuce has been shipped. Usually, the only abnormalities which seem to be of consequence occur when the Texas and Southern California fall shipments begin several weeks before the main deals come in, and in the Salt River Valley and Southern California spring deals where some shippers continue to harvest a few cars as late as June.

It is no doubt true that the intensity of competition may be somewhat overemphasized by Figure 3. In order to further evaluate the question of overlapping, data were secured for each district to cover the same years so as to show the first date shipments exceeded 5 cars when a district was coming in, and the date toward the end of the deal in the same district when daily shipments decreased to 5 cars or less. This same procedure was followed by using 10 cars. As expected, the number of days in the overlap periods were reduced in each case, but the general picture tends to be the same. That is, in recent years there has been an increasing tendency for the major districts to overlap, particularly during the months of October, November, March, April, and May. Whether this tendency to overlap has been of such nature as to cause abnormal shipping conditions or demoralizing effects on the market will be examined when the individual districts are analyzed, and when a price analysis is undertaken.

PERIODS OF INTENSE COMPETITION

Figure 4 shows the average weekly carlot shipments of lettuce from the major districts for the first period as compared to the second period. Significant changes are at once apparent. The general statistical evidence on these comparative shipments and shifts is presented in Table 3. The only noticeable shipments unaccounted for in these data originated in the Central California area (other than the Salinas-Watsonville-Hollister district) during the two periods.

A few outstanding characteristics of the over-all picture in Figure 4 may be noted before going into the individual district analyses. It should first be pointed out that the Salinas-Watsonville-Hollister district dominates the shipping of lettuce for six months each year. In the recent five-year period these six months run from May through October. This leaves a "vacuum" of six months, insofar as this area is concerned, during which the other major districts must ship their entire lettuce crops. Looking at the picture in the

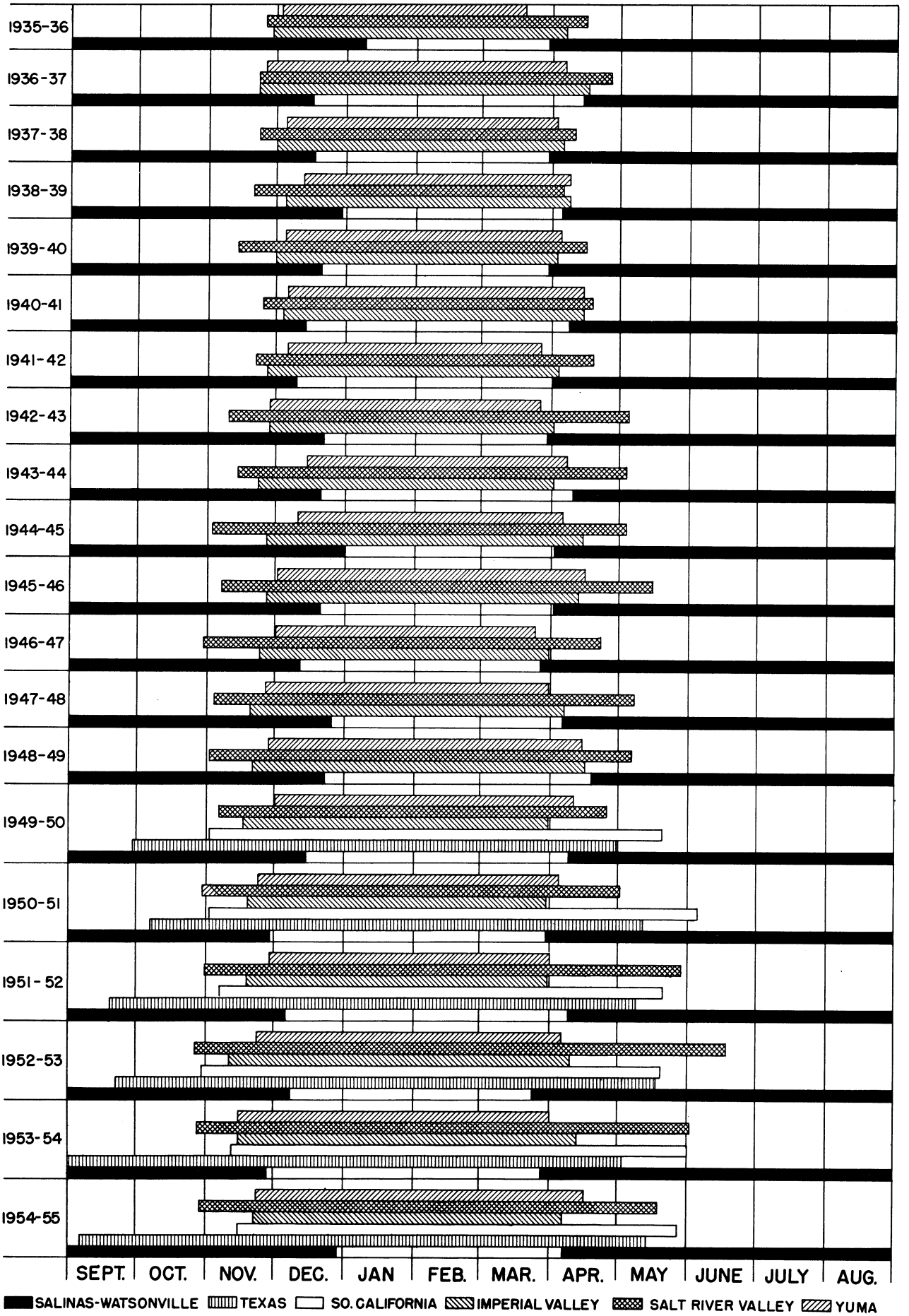


Figure 3. – Overlapping in the major lettuce shipping districts as indicated by first and last car shipments.

Salt River district, we also notice a "vacuum" of shorter duration, the two to three months ranging from mid-December through mid-March. The Imperial district, and the Yuma district to a lesser degree, fill in this winter period. At the same time, Texas ships quite a few cars during January, and Southern California is increasing its shipments in late February, March, and early April.

During the second period the most intense competition appeared to exist around four dates, mid-November, mid-December, mid-March, and mid-April, during the six months when all districts are shipping lettuce. It would appear that during the time intervals around these dates, there is a tendency for the prosperity of producers and shippers to depend more on how the deals are going in other districts.

Another point which should be made here is that only one district -- the Salt River Valley -- is involved in all the periods of overlapping and intense competition. With respect to the dates indicated by the vertical lines (Figure 4), the Fall and Spring deals in this district overlap seriously, both coming in and going out, with other districts.

ANALYSIS OF THE SHIFTS

The changes in timing and methods of producing, harvesting, and packaging lettuce have resulted in shifts in planting dates and marketings which are of great importance to the lettuce industry. To those who have been closely associated with the industry, these shifts have been quite apparent. The magnitude of the shifts, however, have never been generally known, and their specific nature has never been analyzed. The purpose of the analysis of each district is to give producers and distributors a better understanding of the shifts in order that they may make decisions in light of them.

Each of the lettuce-producing districts has its own peculiar characteristics and problems relative to shifts and competitive relationships. For this reason, the districts were studied separately. Each district was studied systematically, and the analysis followed certain patterns of treatment.

First, the shipment data were analyzed for each district or each deal in both time periods in order to point out the nature and degree of the shifts and the time at which they occurred.

Second, an attempt was made to point out the nature of the inter-district shifts, the magnitude of the shifts, and the intensity of competition through the year around certain dates (crossing dates) when new shipments of lettuce from a particular district increased and exceeded shipments of lettuce from another district.

Finally, new lettuce producing areas were analyzed as to their effects on past and existing patterns of shipments.

The Salinas-Watsonville-Hollister District

The Salinas-Watsonville-Hollister district of Central California (hereafter called the Salinas district) is the most important lettuce producing and shipping area in the United States. Each year since the early nineteen thirties, this district has shipped approximately 50 per cent of the commercial lettuce in the United States. During the six months from May through October each year, the Salinas district accounts for more than 80 per cent of the total United States carlot shipments (Table 4).

The average weekly carlot shipments of lettuce from the district during the two periods are plotted in graphic form in Figure 4. Average shipments for the lettuce year were 36,866 cars in the second period and 25,559 in the first period, a 44.2 per cent increase. Ship-

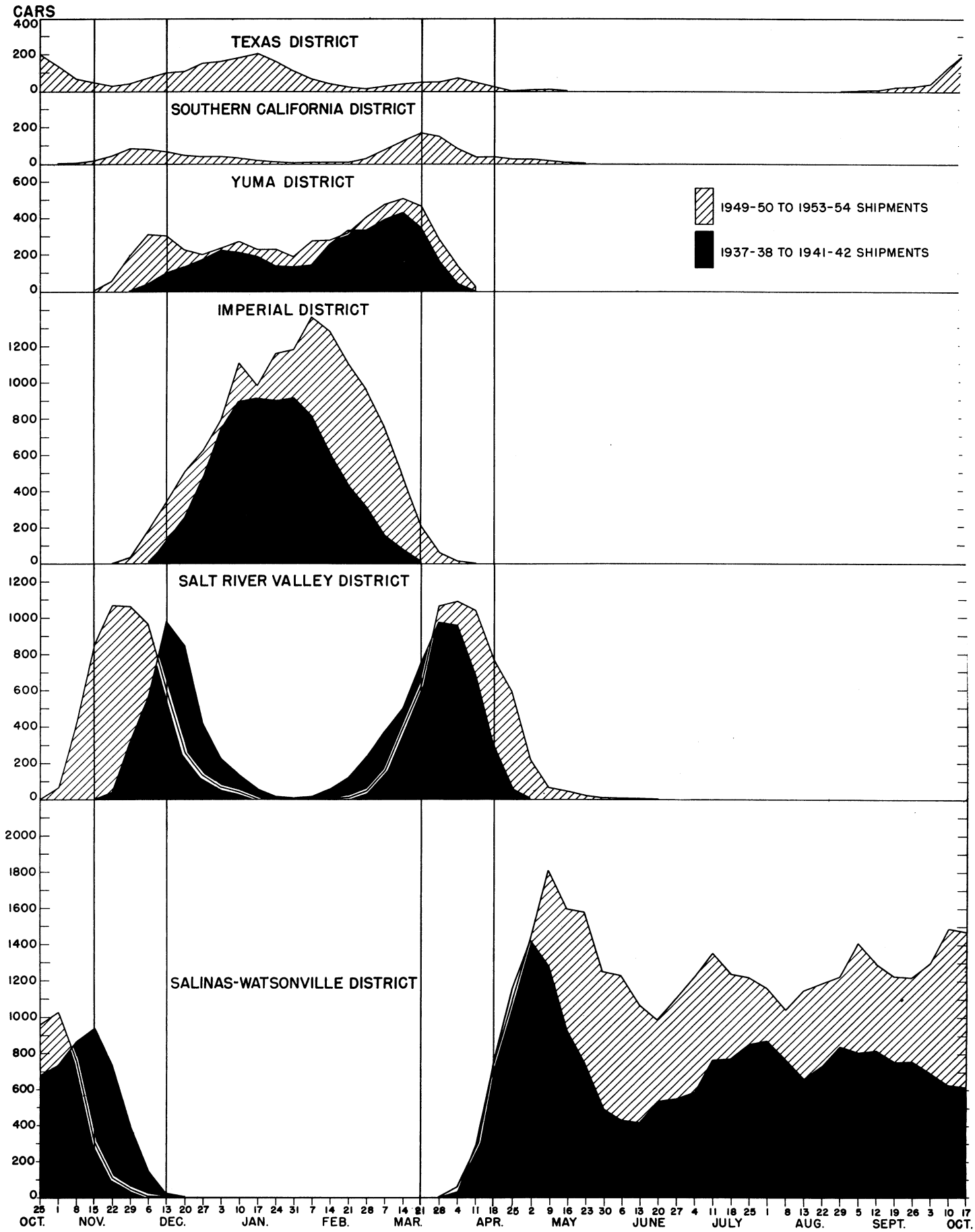


Figure 4.- Average weekly carlot shipments of lettuce, six major districts 1937-38 to 1941-42 and 1949-50 to 1953-54.

Table No. 4.- Comparative percentages of lettuce shipments by weeks from the major districts and the United States, 1937-38 to 1941-42 and 1949-50 to 1953-54.

DATE	UNITED STATES AVERAGE CARLOT SHIPMENTS		SALINAS-WATSONVILLE		SALT RIVER VALLEY		IMPERIAL VALLEY		YUMA VALLEY		SOUTHERN CALIFORNIA		TEXAS		TOTAL PERCENT SHIPPED FROM MAJOR DISTRICTS	
Week including	1st period	2nd period	Per cent of U.S. 1st period	Per cent of U.S. 2nd period	Per cent of U.S. 1st period	Per cent of U.S. 2nd period	Per cent of U.S. 1st period	Per cent of U.S. 2nd period	Per cent of U.S. 1st period	Per cent of U.S. 2nd period	Per cent of U.S. 1st period	Per cent of U.S. 2nd period	Per cent of U.S. 1st period	Per cent of U.S. 2nd period	1st Period	2nd Period
Oct. 25	954	1226	70.96	78.38		.24								16.48	70.96	95.10
Nov. 1	962	1329	76.51	77.13		5.04						.20		10.61	76.51	92.80
8	1039	1309	83.73	54.09		31.78						.53	NO SHIPMENTS	5.50	83.73	91.90
15	1031	1363	90.98	23.11	.01	62.51		.29		.37		1.39		3.60	90.99	91.27
22	846	1358	86.52	7.95	5.20	79.01		.29		4.34		3.31		2.28	91.72	97.18
29	788	1530	50.38	3.14	39.61	69.67		2.48	.63	14.51		5.56		3.07	90.62	98.43
Dec. 6	816	1641	17.00	.49	69.98	58.87	2.00	10.91	5.64	19.32		5.12		4.57	94.62	99.28
13	1215	1432	1.73	.21	80.82	41.76	5.02	23.88	8.89	21.44		4.75		7.26	96.46	99.30
20	1181	1171	.04		73.22	22.29	11.00	43.72	12.02	19.90		4.18		9.22	96.28	99.31
27	893	1173			47.59	11.42	29.10	53.28	20.03	17.48		3.75		13.47	96.72	99.40
Jan. 3	970	1329			23.31	5.49	50.54	60.20	23.93	18.06		3.24		12.49	97.78	99.48
10	1129	1652			11.96	2.36	66.54	67.07	19.58	16.77		2.18		11.38	98.08	99.76
17	1167	1461			4.63	.27	77.04	67.42	16.80	15.95		1.37		14.44	98.47	99.45
24	1105	1596			1.63	.06	83.42	72.87	13.03	14.79		1.13		10.71	98.08	99.56
31	1070	1520			1.13	.20	84.41	77.96	12.43	12.96		.53		7.57	97.97	99.22
Feb. 7	1102	1738			1.09	.12	83.59	78.71	13.43	16.05		.58		4.03	98.11	99.49
14	1161	1652			4.57	.06	70.44	78.15	23.34	17.31		.67		2.72	98.35	98.91
21	1184	1494			10.14	.47	56.28	74.23	30.82	21.95		.74		1.67	97.24	99.06
28	1031	1486			23.18	3.16	41.80	65.07	32.69	27.73		2.15		1.14	97.67	99.25
Mar. 7	1117	1508			33.93	10.74	28.02	49.67	35.90	31.96		5.17	NO SHIPMENTS	1.99	97.85	99.53
14	1113	1559			45.10	25.08	13.75	31.43	39.17	32.84		8.15		2.69	98.02	100.19
21	1239	1542			61.26	40.92	6.22	13.42	28.74	31.00		10.89		3.24	96.22	99.47
28	1241	1628	.32	.18	79.03	65.85	1.13	3.62	13.46	17.69		9.21		3.38	93.94	99.93
Apr. 4	1183	1559	5.16	1.86	81.40	70.30		1.09	3.47	9.30		5.52		4.68	90.03	92.75
11	1073	1582	25.72	18.90	57.60	66.12		.19	.09	1.83		2.47		3.22	83.41	92.73
18	1243	1713	60.73	43.30	21.64	45.30						2.45		1.40	82.37	92.45
25	1420	1807	81.34	60.21	4.15	32.76						1.49		.44	85.49	94.90
May 2	1595	1816	90.03	79.74	.88	12.44						1.49		.55	90.91	94.22
9	1381	2050	92.99	88.49		3.41						1.46		.59	92.99	93.95
16	1020	1817	91.56	88.17		2.86						1.10		.28	91.56	92.41
23	902	1711	82.34	92.81		1.58						.47			82.34	94.86
30	617	1394	79.04	89.89		.79						.22			79.04	90.90
June 6	568	1282	76.58	96.57		.62						.08			76.58	97.27
13	583	1150	73.41	92.96		.70									73.41	93.66
20	658	1058	82.22	93.57		.19									82.22	93.76
27	699	1156	78.25	95.50											78.25	95.50
July 4	720	1278	81.94	95.93											81.94	95.93
11	911	1401	84.41	96.86											84.41	96.86
18	885	1316	87.23	94.45											87.23	94.45
25	966	1310	88.41	93.59											88.41	93.59
Aug. 1	971	1259	89.70	91.98											89.70	91.98
8	822	1163	93.67	89.34											93.67	89.34
15	806	1228	82.63	93.65											82.63	93.65
22	878	1264	83.37	93.90										.15	83.37	93.90
29	966	1325	87.27	92.60										.39	87.27	92.75
Sept. 5	946	1520	85.10	92.76										.36	85.10	93.15
12	902	1396	90.58	92.62										2.10	90.58	92.98
19	815	1238	93.25	91.28										2.37	93.25	93.38
26	812	1225	93.72	91.84										3.54	93.72	94.21
Oct. 3	766	1300	90.86	91.77										9.03	90.86	95.31
10	780	1495	81.15	84.62										14.58	81.15	93.65
17	869	1475	71.34	80.88											71.34	95.46

ments increased on the average of 390 cars per week between the two periods3/ (Table 3).

The greatest increases in lettuce shipments from the Salinas district came during the three months May, June, and July. Six weeks of this interval showed an average gain of more than 600 cars (Table 5). The abnormally rapid growth of the industry in May and June is probably due to: (1) Adverse weather conditions which often delay the April harvest, (2) the high demand for lettuce because of warming temperatures, and (3) the absence of sufficient volume of lettuce in other districts, particularly local areas, to fill the demand. Large gains were also shown in early September and October. Lettuce shipments from the Salinas area declined during the months of April and November. This decline is discussed below.

Competition and Shifts

Shipments of lettuce from the Salinas district during the month of November in the second period were only 1,840 cars compared to 3,329 cars in the first period; and only 17 cars during December in the later period as compared to 220 cars during the early period.

On the average, the Salinas district accounted for about 81 per cent of the total United States shipments of lettuce in November during the period 1937-38 to 1941-42. In the same month of the period 1949-50 to 1953-54, this percentage has decreased to approximately 32 per cent of the United States total. Shipments in December decreased from five per cent of the United States total in the early period to a negligible amount in the later period (Table 5).

In the month of April, the shifts were not so large and abrupt, but were sizeable. Again referring to Table 5, average shipments during April of the first period amounted to 2,743 cars as compared to 2,392 cars during the second period, a decrease of 12 per cent. When compared to total United States shipments, however, this is a decline of 17 per cent (from 51 to 34), due partly to the rapid growth of shipments from other areas between the two periods.

Important questions in this analysis are: Which districts were responsible for the losses in shipments in the Salinas area during November, December, and April, and why were these shifts possible? The first question is easier answered than the second. Tables 4 and 5 and Figures 2 and 4, which present statistics and pictures of the composition of weekly and monthly shipments of lettuce from the various districts, show that the losses in the Salinas district during the months in question have been almost equally offset by gains in the Salt River Valley. Also, the Yuma, Texas, and Southern California districts have increased their shipments during these months.

Crossing Dates

In order to ascertain the rapidity with which the Salinas deal had shifted out of November, December, and April with respect to other deals which were in production at the same time, crossing dates were secured with respect to the districts from which new shipments of lettuce originated. These dates were secured for the 18-year period, 1937-38 to 1954-55, by taking those days on which the new daily shipments of lettuce from each of the principal competing areas exceeded daily shipments from Salinas. Once a deal is going out, and its daily shipments are exceeded by daily shipments from another which is coming in, the two districts seldom recross. However, where a recrossing date occurred in this procedure, that date taken was that on which the "new" district surpassed the "old" for the last time.

3/ Only those weeks in which weekly carlot shipments exceeded 100 were included in calculating this increase in cars per week.

Table No 5.- Comparative monthly shipments of lettuce from the major districts, and percentages, 1937-38 to 1941-42 and 1949-50 to 1953-54.

District and Month	FIRST PERIOD			SECOND PERIOD			Per cent inc. or dec. between 1st and 2nd periods
	District average	U.S. average	Pct. District is of U.S.	District average	U.S. average	Pct. District is of U.S.	
Salinas							
Oct.	2903.8	3762.8	77.2	4787.6	5865.8	81.6	+ 4.4
Nov.	3329.0	4087.8	81.4	1840.8	5830.0	31.6	- 49.8
Dec.	219.8	4441.2	5.0	16.8	6161.2	.3	- 4.7
Jan.	--	4876.8	--	--	6681.6	--	--
Feb.	--	4369.2	--	1.8	6398.4	.03	+ .03
Mar.	2.2	5283.4	.04	3.8	6833.8	.06	+ .02
Apr.	2743.4	5361.6	51.0	2392.4	7128.2	33.6	- 17.4
May	4252.8	4777.0	89.0	7083.6	7909.8	89.6	+ .5
Salt River							
Oct.	--	3762.8	--	4.0	5865.8	.07	+ .07
Nov.	268.0	4087.8	6.6	3117.8	5830.0	53.5	+ 46.9
Dec.	2997.4	4441.2	67.5	2356.2	6161.2	38.2	- 29.3
Jan.	390.4	4876.8	8.0	69.2	6681.6	1.1	- 7.0
Feb.	289.4	4369.2	6.6	90.8	6398.4	1.4	- 5.2
Mar.	2882.8	5283.4	54.6	2183.4	6833.8	31.3	- 23.3
Apr.	1792.6	5361.6	33.4	3739.2	7128.2	52.5	+ 19.1
May	10.2	4777.0	.02	256.4	7909.8	3.2	+ 3.2
Yuma							
Oct.	--	3762.8	--	--	5865.8	--	--
Nov.	3.2	4087.8	.08	178.2	5830.0	3.1	+ 3.0
Dec.	529.6	4441.2	11.9	1221.0	6161.2	19.8	+ 7.9
Jan.	844.2	4876.8	17.3	1048.2	6681.6	15.7	- 1.6
Feb.	1011.4	4369.2	23.2	1187.2	6398.4	18.6	- 4.6
Mar.	1501.6	5283.4	28.4	1989.8	6833.8	29.1	+ .7
Apr.	30.4	5361.6	.6	133.8	7128.2	1.9	+ 1.3
Imperial							
Oct.	--	3762.8	--	--	5865.8	--	--
Nov.	--	4087.8	--	22.2	5830.0	.4	+ .4
Dec.	514.2	4441.2	11.6	1771.8	6161.2	28.8	+ 17.2
Jan.	3543.8	4876.8	72.7	4598.2	6681.6	68.8	- 3.9
Feb.	2981.0	4369.2	68.2	4779.2	6398.4	74.7	+ 6.5
Mar.	718.2	5283.4	13.6	1908.0	6833.8	27.9	+ 19.3
Apr.	4.6	5361.6	.1	14.4	7128.2	.2	+ .1
Texas							
Oct.	NONE IN FIRST PERIOD.	3762.8		611.0	5865.8	10.4	+ 10.4
Nov.		4087.8		237.4	5830.0	4.1	+ 4.1
Dec.		4441.2		471.8	6161.2	7.7	+ 7.7
Jan.		4876.8		800.8	6681.6	12.0	+ 12.0
Feb.		4369.2		193.8	6398.4	3.0	+ 3.0
Mar.		5283.4		174.4	6833.8	2.6	+ 2.6
Apr.		5361.6		171.6	7128.2	2.4	+ 2.4
May		4777.0		22.8	7909.8	.3	+ .3
So. Calif.							
Oct.		3762.8		1.4	5865.8	.3	+ .3
Nov.		4087.8		127.2	5830.0	2.2	+ 2.2
Dec.		4441.2		280.8	6161.2	4.6	+ 4.6
Jan.		4876.8		101.8	6681.6	1.5	+ 1.5
Feb.		4369.2		101.4	6398.4	1.6	+ 1.6
Mar.		5283.4		518.4	6833.8	7.6	+ 7.6
Apr.		5361.6		191.6	7128.2	2.7	+ 2.7
May		4777.0		83.2	7909.8	1.1	+ 1.1

Crossing dates for the Salinas district were obtained in this manner with the Salt River, Yuma, and Imperial districts in the Fall and with the Salt River district in the Spring (Figures 5, 6, 7, and 8). Trends were mathematically determined for these dates and are shown by the heavy dashed lines in each instance.

The trend of the Fall crossing dates in all three instances shows daily shipments from other districts exceeding those from Salinas at a progressively earlier date in November and December. In the Salt River district, the date on which shipments have surpassed shipments from the Salinas district has moved from November 30 in the 1937-38 season to November 7 in the 1954-55 season. There was a steady tendency for this crossing date to move to an earlier time in November. The rate of this shift was about one and one-half days per year.

In the case of the Salinas and Yuma districts, the crossing date moved from December 9 in the 1937-38 season to November 25 in the 1954-55 season, about one and one-half days per year. This indicates that the Yuma deal has also been moving to an earlier Fall peak, following the Salt River Valley peak by about two weeks.

The crossing dates of the Salinas district with Imperial moved from December 9 in the 1937-38 season to November 26 in the 1954-55 season, about the same rate of shift as occurred in the Salt River and Yuma districts.

Hence, we see that all three of the competing districts, Salt River Valley, Yuma, and Imperial, were associated with the shift of Salinas out of the late Fall shipping season. All these districts advanced into November and early December at about the same rate, but it was the Salt River district which was primarily associated with the advance. The intensity of the competition around the crossing dates will be examined in the next section.

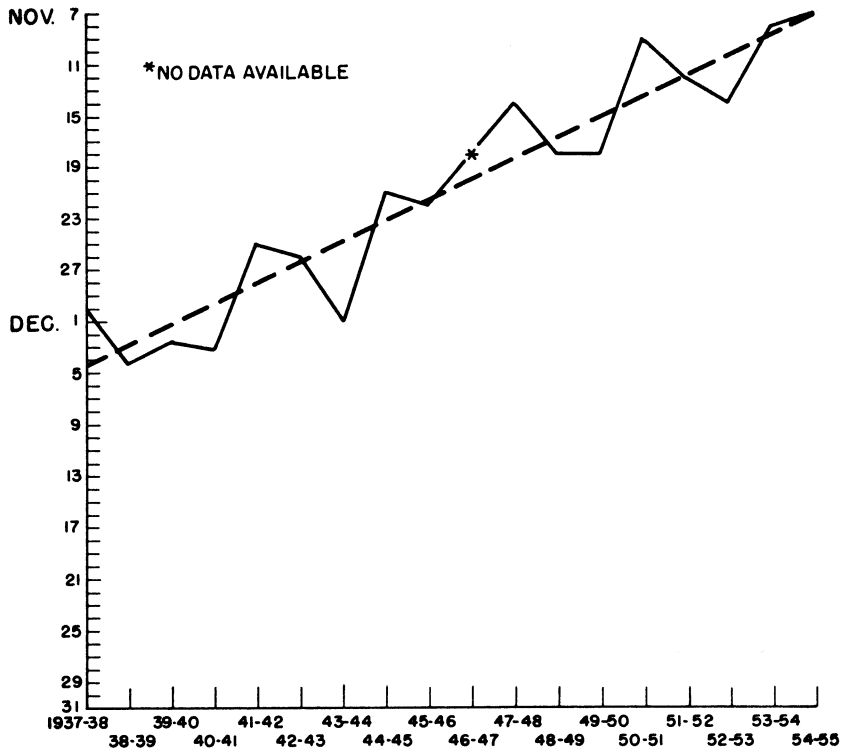
Of the three major competing districts mentioned above, only the Salt River district is seriously involved with Salinas in the Spring deal. There was only a slight trend toward a later Spring crossing date for the two areas, as evidenced by a small slope in the broken trend line (Figure 8). The wide fluctuations characterizing these crossing dates were probably due to weather variations in the Salt River area toward the end of the deal, or in the Salinas area at the beginning of the deal. In the past, the Salinas area has generally held its own at the beginning of its Spring deal (Figure 4). Under favorable weather conditions it is probable that high quality lettuce crops will be difficult to shift out of their transitional position in this district during late April and early May.

Intensity of Competition

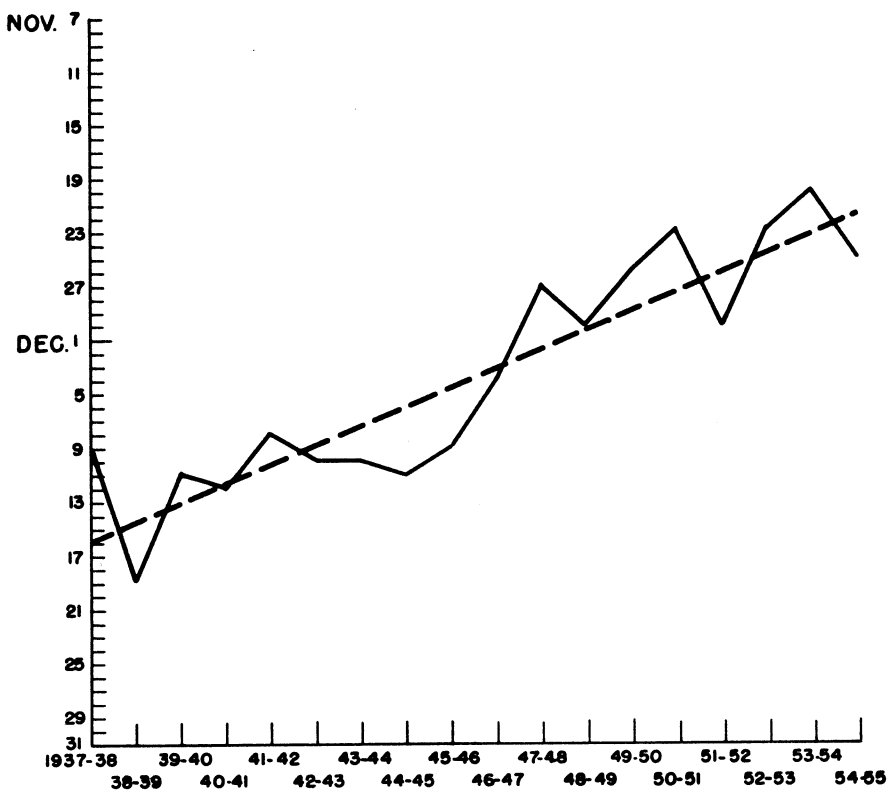
Examination of the data on crossing dates makes it apparent that certain seasonal changes have occurred in the Salinas district. But such data give little evidence of the degree of competition during the crossing periods. Moreover, the data do not show the relative volumes of daily shipments from the competing districts as they are distributed around the crossing dates through time.

In order to show something of the nature and intensity of competition during the crossing periods, daily shipments for ten days before and ten days after the crossing date were compiled. These data for Salinas, compared with Salt River, Yuma, and Imperial districts, are plotted for the seasons 1937-38 to 1954-55 in Figures 9, 10, 11, and 12. The strong interdependence of the Salinas-Salt River deals in the Fall is again emphasized. It will be noted that in recent years these two districts accounted for almost 250 cars of lettuce per day for many days during the overlap period. Another noticeable characteristic is the rapidity with which Salinas goes out and Salt River comes in once the deal in the latter district is underway.

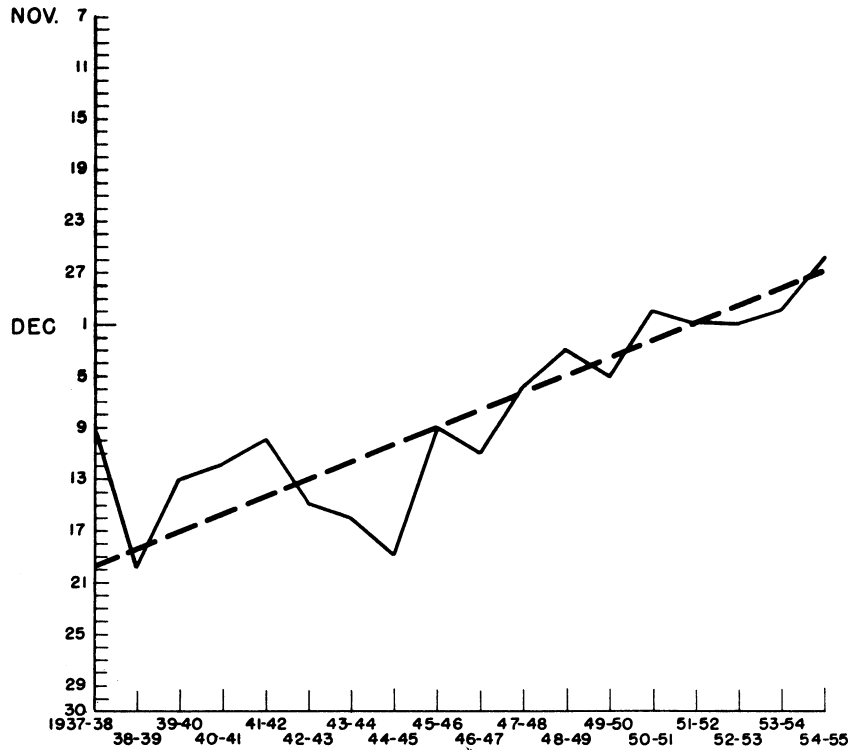
The Yuma and Imperial deals played minor roles in "pushing" Salinas out of November and December. Shipments from the Texas and Southern California areas, which are not compared with Salinas here, are becoming more important as competitive forces during the Salt River-



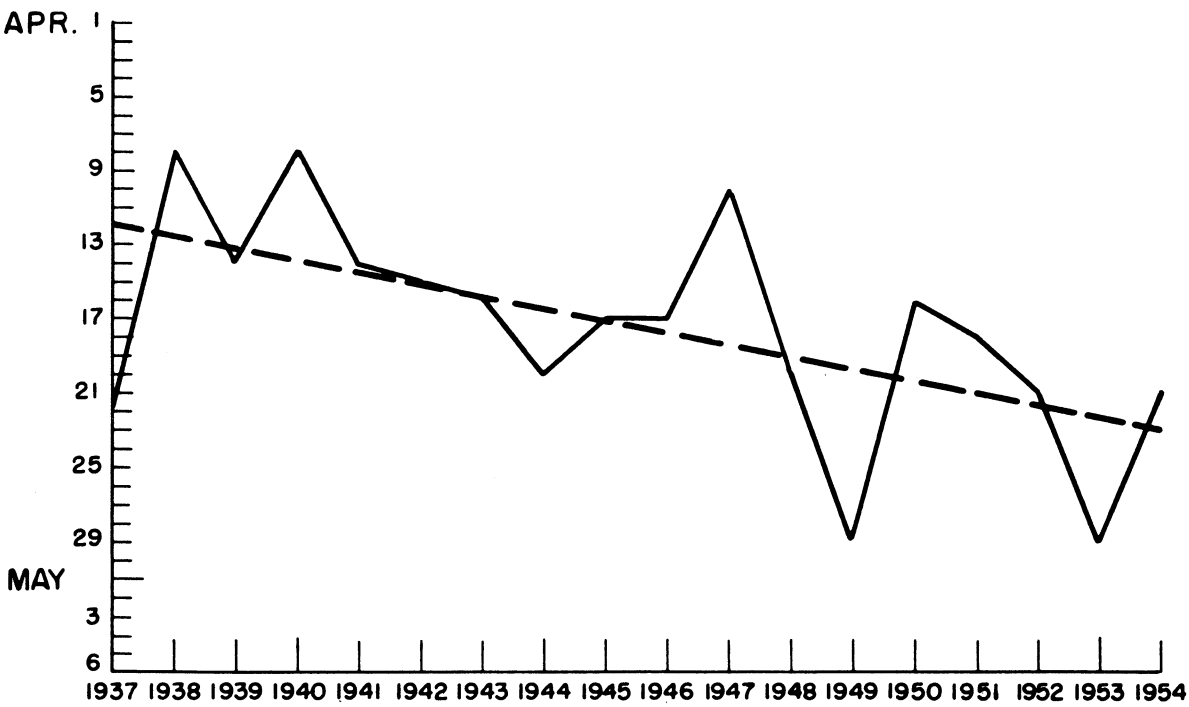
CROSSING DATES FOR SALINAS-WATSONVILLE FALL DEAL
WITH SALT RIVER VALLEY
1937-38-1954-55
Figure 5.



CROSSING DATES FOR SALINAS-WATSONVILLE FALL DEAL WITH YUMA
1937-38 — 1954-55
Figure 6.



CROSSING DATES FOR SALINAS-WATSONVILLE FALL DEAL
WITH IMPERIAL VALLEY
1937-38— 1954-55
Figure 7.



CROSSING DATES BETWEEN SALINAS-WATSONVILLE &
SALT RIVER VALLEY (SPRING DEAL)
1937-1954
Figure 8.

Salinas overlap period.

In the Spring Salt River-Salinas overlap, there has been some stability in daily shipments from both areas over the years (Figure 12). This points up the absence of a shift in crossing dates brought out above, although there has been some fluctuation in those dates. At the same time, there was a sizeable growth in the combined shipments from the two areas through the years.

An attempt was made to measure the intensity of competition around the crossing dates. The combined weekly sums of daily shipments for pairs of competing areas were set up by years (1937 to 1954) in three columns representing shipments in the "week before," shipments in the "week after," and shipments during the "crossing date week." The method of testing for differences between means for paired observations was utilized to test the "week after" and "week before" against the "crossing date week," and the "week before" against the "week after" on the hypothesis that the means are equal. This method assumes that no extraneous factors existed over the years to cause the means to be different. Tests were run for Salinas against the Salt River Fall and Spring deals, and for Salinas against the Yuma and Imperial deals. In no instance was the difference in the means found to be significant, and in most instances the values of "t" were found to be low. Thus, within the limitation of the "t" test and the method of pairing observations, it is reasonable to believe that the competition around the crossing date period, as evidenced by carlot shipments, is no more serious than competition at other times.

It should be pointed out again that there may be certain "leakages" in data due to local marketing of lettuce and truck shipments, which are not included in carlot shipment data. Also, price competition between areas should be measured before definite conclusions are reached.

The Salt River District -- Fall Deal

The Salt River Valley district is the most important lettuce shipping area in Arizona, shipping approximately 12,000 cars of lettuce annually. These shipments are almost equally divided between Fall and Spring deals, with small amounts of lettuce shipped in January and February. Analysis will first be made of the Fall deal, which runs from late October through January.

Average total shipments for the Fall deal were 5,556 cars in the second period and 3,633 cars in the first period, an increase of 52.9 per cent. Shipments increased on the average of 170 cars per week between the two periods 4/ (Table 3).

The most noticeable characteristic for this area has been the magnitude of the seasonal shift (Figure 4). As was pointed out in previous sections, this shift was at the expense of the Salinas district. In addition to this, the Salt River district has shown a greater overall rate of growth than Salinas (52.9 per cent as compared to 44.2 per cent).

Competition and Shifts

The shift of lettuce shipments in the Salt River Fall deal has, perhaps, been the most sizeable of all those studied. For example, shipments during the month of November in the second period averaged 3,118 cars as compared to only 268 cars in the first. In December, they decreased to 2,356 cars in the second period from 2,997 cars in the first period; and in January to 69 cars from 390 cars (Table 4). The district accounted for about 54 per cent of total United States lettuce shipments during November of the second period, as compared to 7 per cent in the first period. In December of the second period, only 38 per cent of

4/ Only those weeks in which weekly carlot shipments exceeded 100 were included in calculating this increase in cars per week.

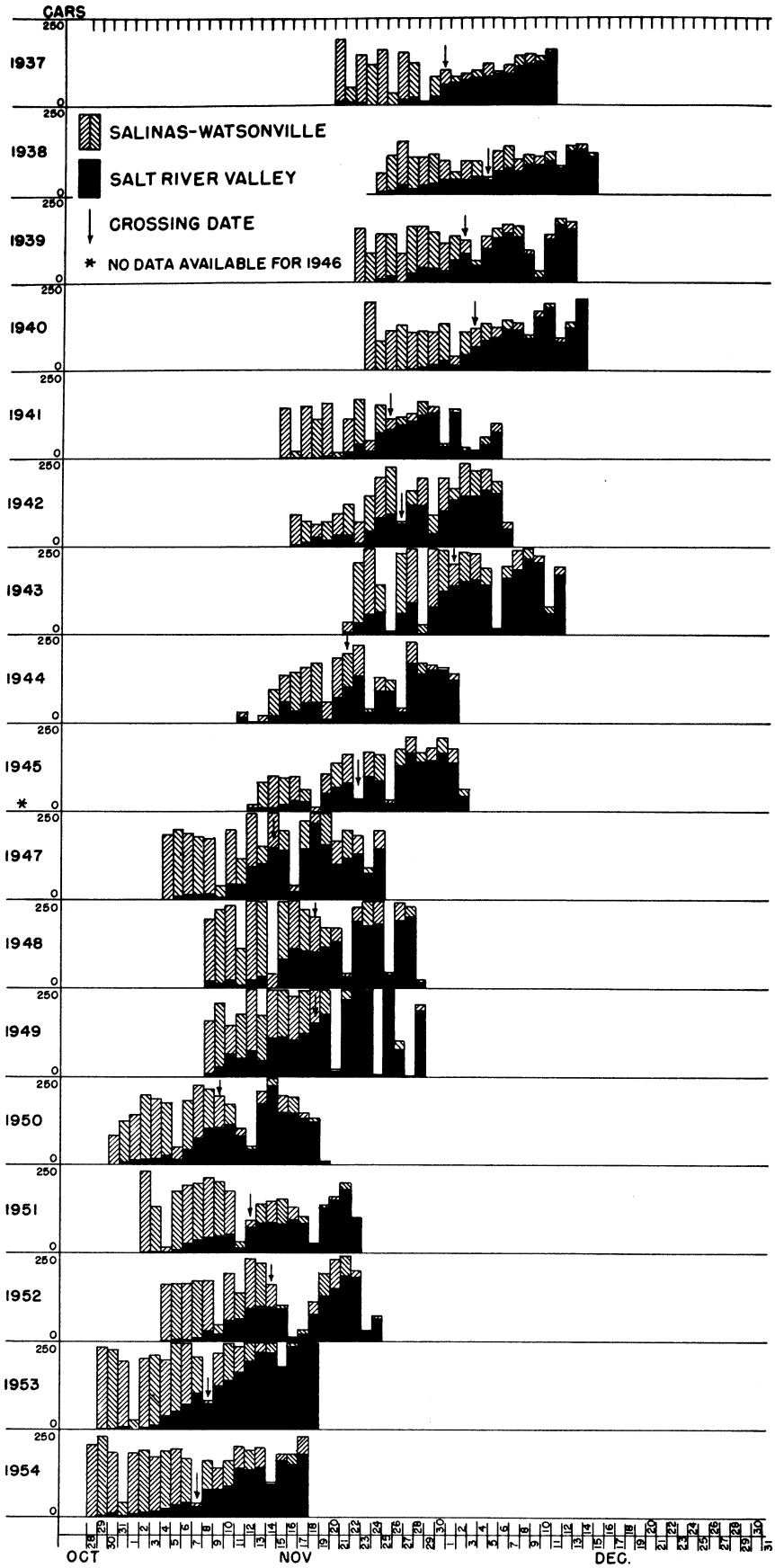


Figure 9.— Crossing dates and carlot shipments of lettuce, Salt River Valley (fall) and Salinas-Watsonville deals 1937-1954.

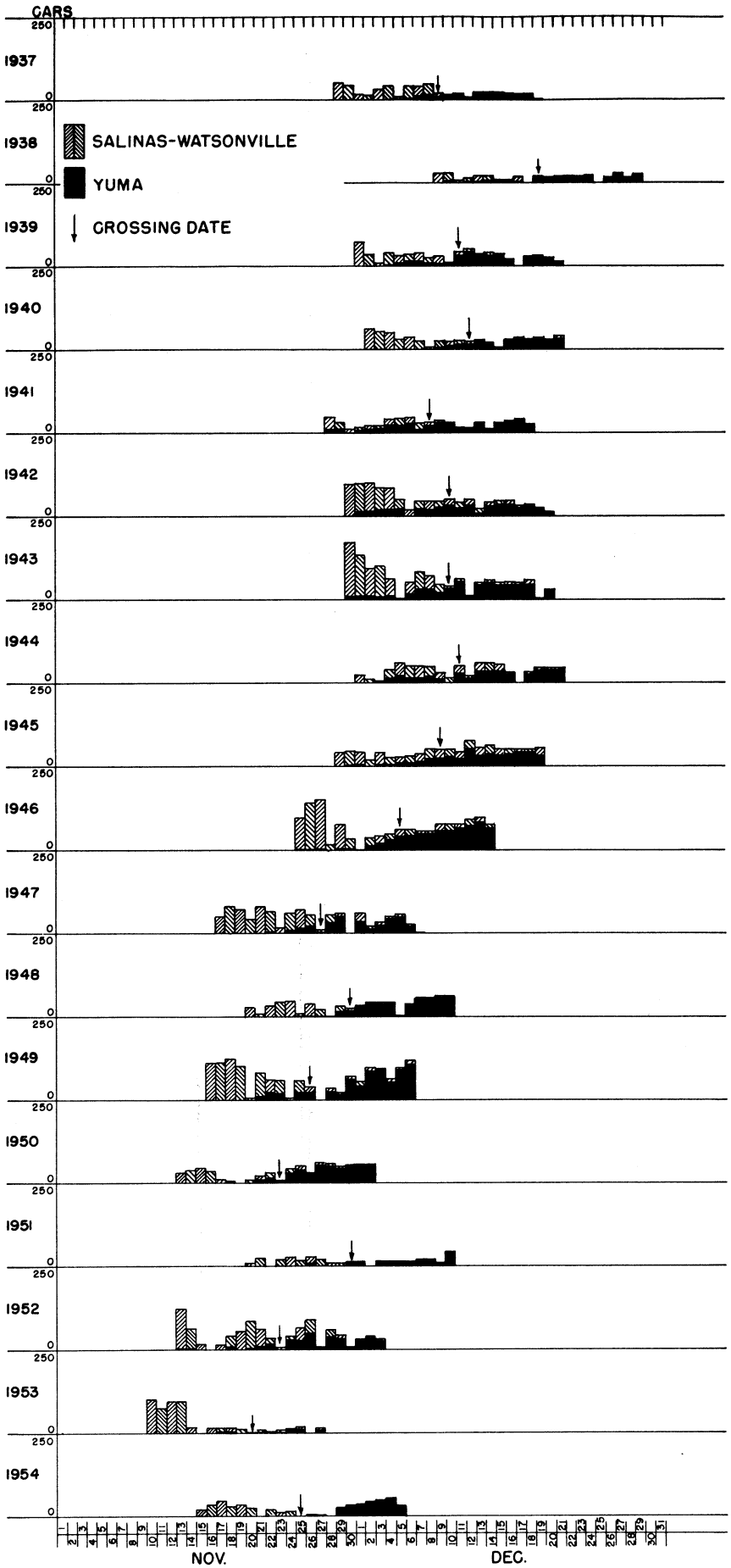


Figure 10.– Crossing dates and carlot shipments of lettuce, Yuma (fall) and Salinas-Watsonville deals 1937-1954.

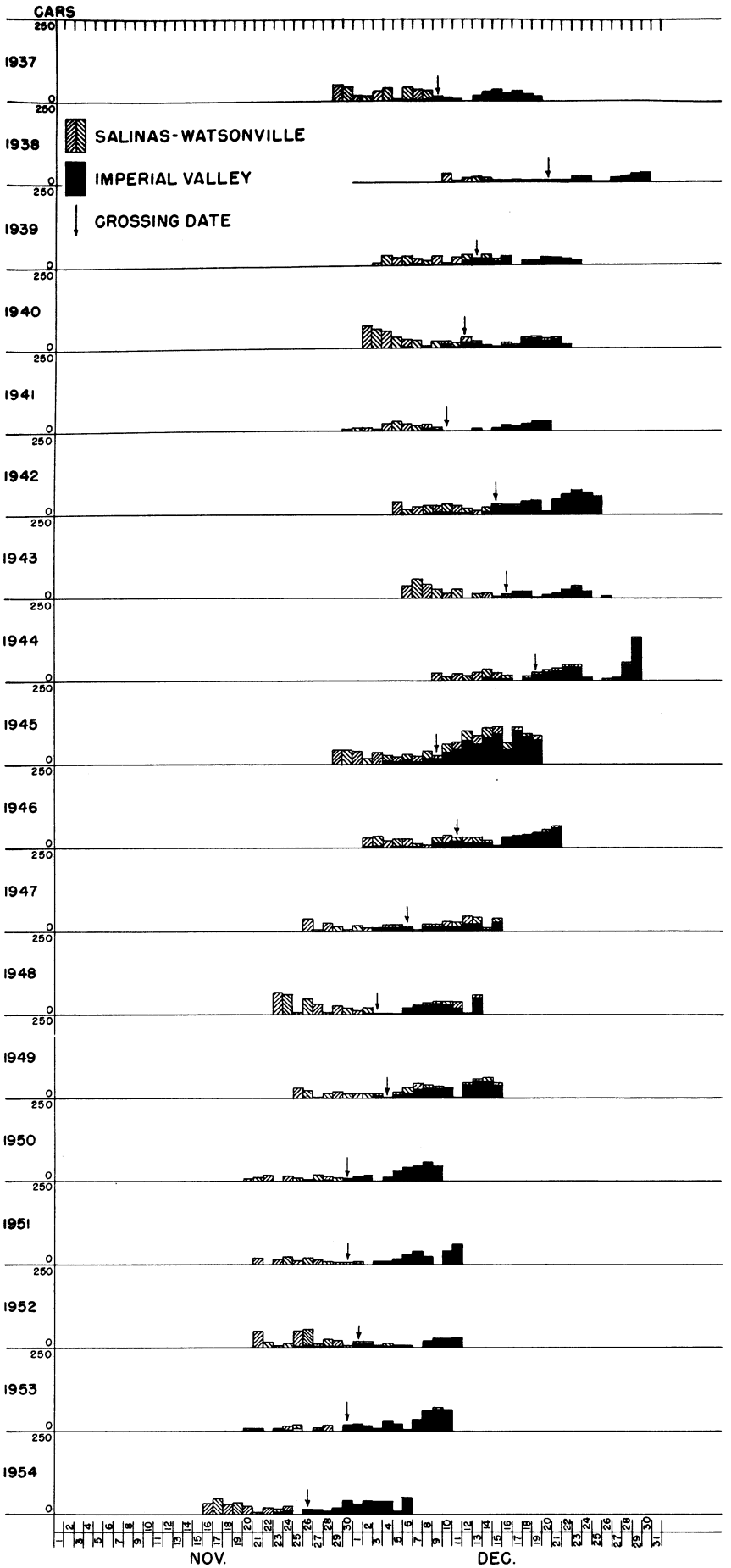


Figure 11.– Crossing dates and carlot shipments of lettuce, Imperial Valley (fall) and Salinas-Watsonville deals 1937-1954.

all lettuce was shipped from this district, a decline of 30 per cent from the first period. In January, these figures were 1 per cent for the second period and 8 per cent for the first.

While the Salt River district became responsible for the bulk of the November shipments, the Yuma and Imperial districts moved into December and put pressure on this deal as it was going out. Also, Texas shipments have grown during December, and they have more than offset the losses of the Salt River district in January. The Salt River Valley peak has shifted to a position which is two to three weeks earlier than in the first period. In a "normal" year, the bulk of the lettuce in this deal is now shipped by the end of the second week in December, the date at which the deal used to hit its peak.

The 1954-55 Fall deal was no exception to the pattern of shipments established in the second period. By the end of the second week of December, 1954, approximately 3,550 cars had been shipped out of a total of about 5,700. The Fall peak in 1954 came at about the same time as the average peak in second period shipments.

Crossing Dates

It was shown in the last section that the most important crossing date relative to Salt River Fall lettuce shipments was the one involving the Salinas district (Figure 5). The shift of the crossing dates for these two districts (from early December to early November) was at the rate of about one and one-half days per year for the period studied. Whether this trend will continue depends on factors to be discussed separately in a later section.

As the Salt River Fall deal shifted out of December and January, shipments from Yuma, Imperial, and Texas (in recent years) filled the vacuum. It is probably more realistic to say that as Yuma, Imperial, and Texas moved into the winter period, the Salt River district shifted into November, where competition was not so keen.

The crossing dates of the Fall Salt River and Yuma daily shipments are shown in Figure 13. There has been a wide fluctuation in these dates, a fact which renders the trend less meaningful. However, there is little doubt that Yuma is shipping relatively more lettuce during the period from December 15 through the month of January. The crossing date moved from December 25 in the 1937-38 season to December 15 in the 1954-55 season. The rate of shift averaged nearly one day per year during this period.

The crossing dates of the Salt River and Imperial daily shipments moved from December 27 in the 1937-38 season to December 11 in the 1954-55 season, an average rate of shift of about 1 1/3 days per year (Figure 14). The shift of the Imperial Valley into a completely dominant position in the early winter season was probably responsible for this faster rate of shift as compared to Yuma. And, as will be seen later, the competition between these two areas (Imperial and Yuma) may be somewhat responsible for their differing rates of shift. The shift in the Imperial-Salt River Fall crossing date has also been steadier than the shift in the Salt River-Yuma crossing date.

Intensity of Competition

A study of the Salt River-Yuma data in Figure 15 shows that the volume of shipments from each area has fluctuated widely, as have the crossing dates. One of the most representative characteristics of this combination is the rapidity with which the Salt River deal decreased once it began going out. In the Salt River-Imperial data (Figure 16), we find a somewhat similar situation, except that the crossing dates show a more definite trend through time. In both cases, however, there has been a notable fluctuation within years.

The method of measuring the degree of competition around crossing dates was explained on page 21 in the Salinas section. The reader is asked to refer to this treatment for details. In testing the combined shipments during the "crossing date week" against the

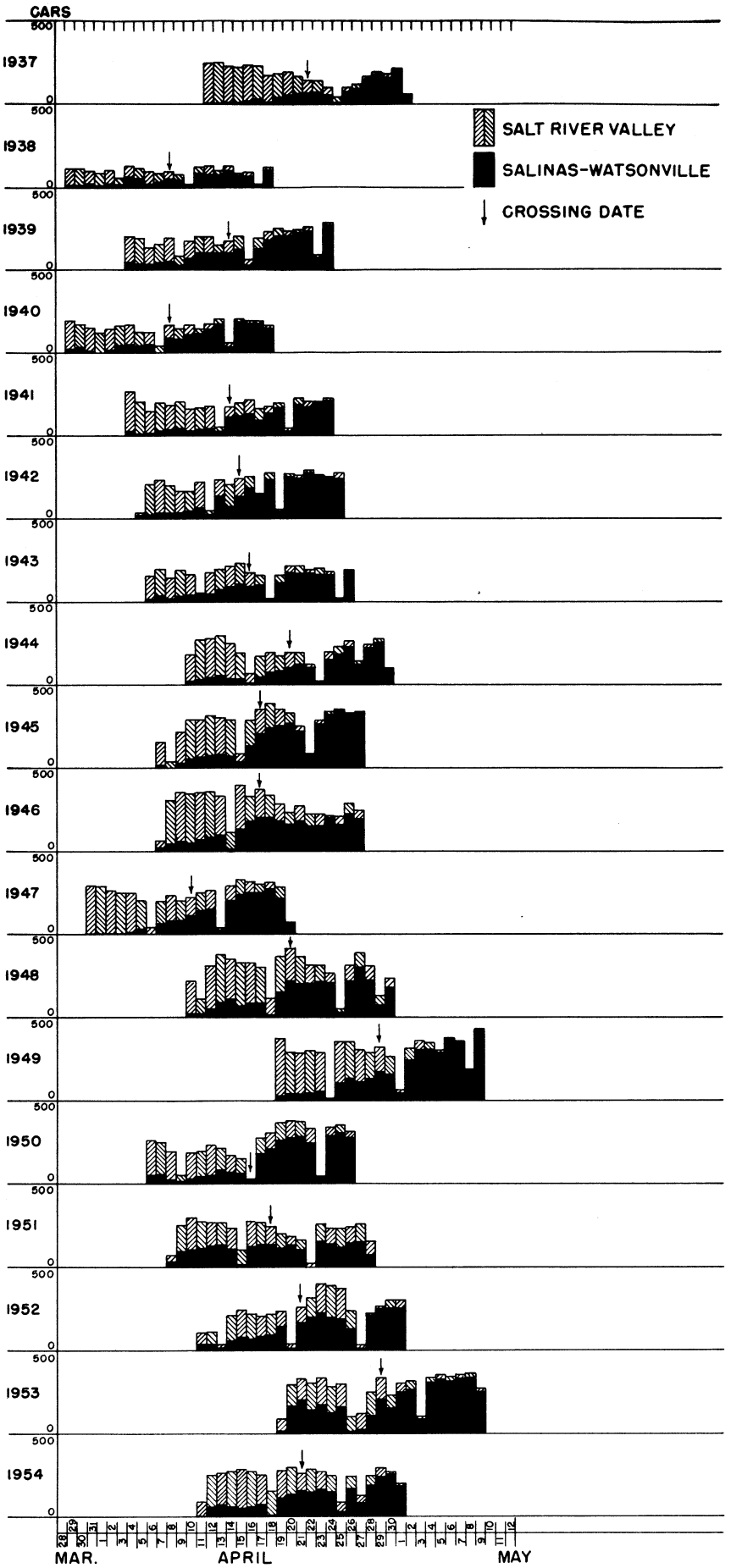
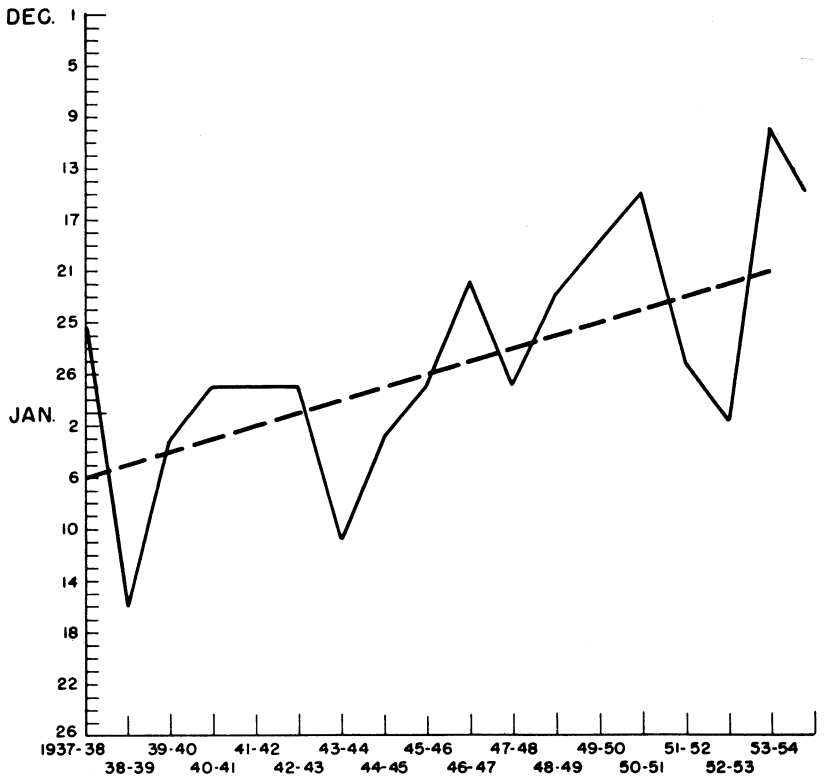
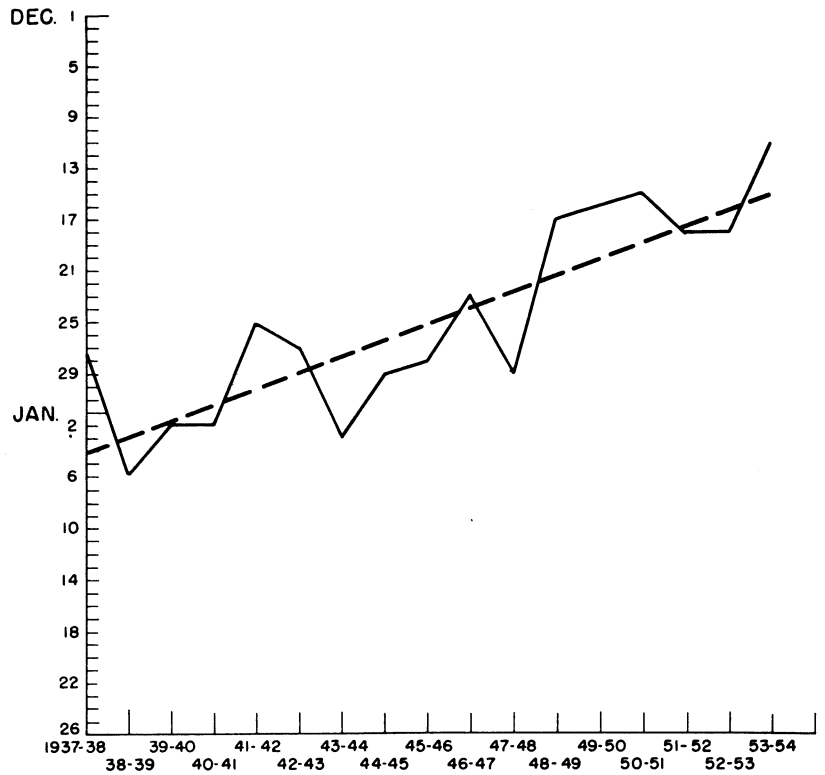


Figure 12.— Crossing dates and carlot shipments of lettuce Salinas-Watsonville and Salt River Valley (spring) deals 1937-1954.



CROSSING DATES FOR SALT RIVER VALLEY FALL DEAL WITH YUMA
1937-38—1953-54
Figure 13.



CROSSING DATES FOR SALT RIVER VALLEY FALL DEAL
WITH IMPERIAL VALLEY
1937-38—1953-54
Figure 14.

shipments during the "week after" and the "week before" for the Salt River-Yuma, Salt River-Imperial districts, no evidence was found that the competition was keener around the crossing dates.

The Salt River District -- Spring Deal

The Spring lettuce deal in the Salt River Valley runs from February through June. Normally, little lettuce is shipped during the month of February, and the deal has been shifting more and more into March and April. Very little lettuce is shipped in late May and June.

Average total shipments for this deal were 6,228 cars in the second period compared with 4,967 cars in the first period, an increase of 25.4 per cent. This was the smallest gain recorded among the major lettuce-shipping districts. Shipments increased on the average of 129 cars per week between the two periods 5/ (Table 3).

There was a significant shift out of the late Winter period in this deal, but it was not as marked as the shift in the Fall deal. Shipments decreased in the first seven weeks of the deal, the largest decrease coming in the first week of March (Figure 4). This decrease was more than offset by over-all growth of the deal, and a shift into May and June.

The 1955 Spring deal in the Salt River district conformed to the general pattern shown in the second period, except that shipments ran later than usual due to the cool Spring throughout all shipping areas. The 1955 deal was also considerably larger than the average deal of the second period. Approximately 7,700 cars were shipped compared to the 6,228 average given in Table 3 for the second period. Cool weather and strong demand were probably principal factors behind this increase.

Competition and Shifts

The shift of lettuce shipments out of February in the Salt River Spring deal is relatively unimportant because of the small amounts of lettuce involved. Shipments decreased to an average 91 cars during that month in the second period, compared to 289 cars in the first (Table 4). The most significant decrease in shipments came in March, from an average of 2,883 cars in the first period to 2,183 cars in the more recent period. This was more than offset, however, by a gain of 1,947 cars (nearly 110 per cent) in April.

The percentage of total United States shipments supplied by the Salt River Valley during the Spring deal has remained relatively stable. Eighty-eight per cent of the lettuce shipped during March and April of the first period came from this area. The comparable figure for the second period is 84 per cent. The decrease during these two months was offset by a gain in May shipments of about 3 per cent.

The Imperial and Yuma districts were most responsible for the competition at the beginning of the Spring deal and the Salinas district at the end of the deal. These are the same competitors, in opposite roles, as in the Fall deal. During recent years, the Southern California district has also been a very important factor during the month of March. In addition, Texas shipments have given some competition.

The tables and figures which have been presented indicate that the shift in this deal has been sizeable, but not as great as that in the Fall deal. It may be that competition from all quarters is more serious, as indicated by the lack of growth. Southern California and Yuma present formidable obstacles during March, and Salinas appears to be almost unmovable in normal years from its dominant position, which usually begins in mid-April. Hence,

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5/ Only those weeks in which weekly carlot shipments exceeded 100 were included in calculating this increase in cars per week.

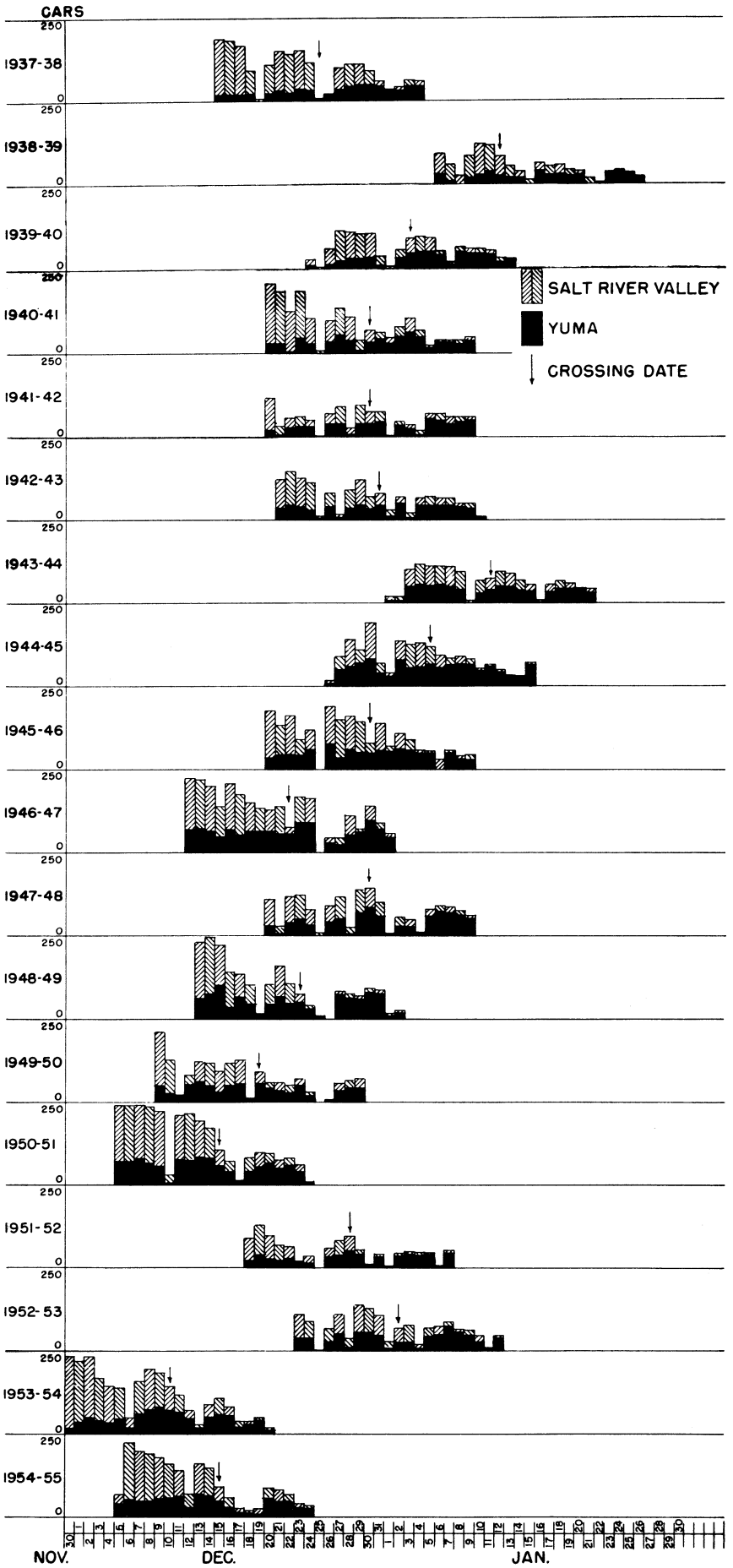


Figure 15.-Crossing dates and carlot shipments of lettuce, Salt River Valley(fall) and Yuma deals 1937-38 through 1954-55

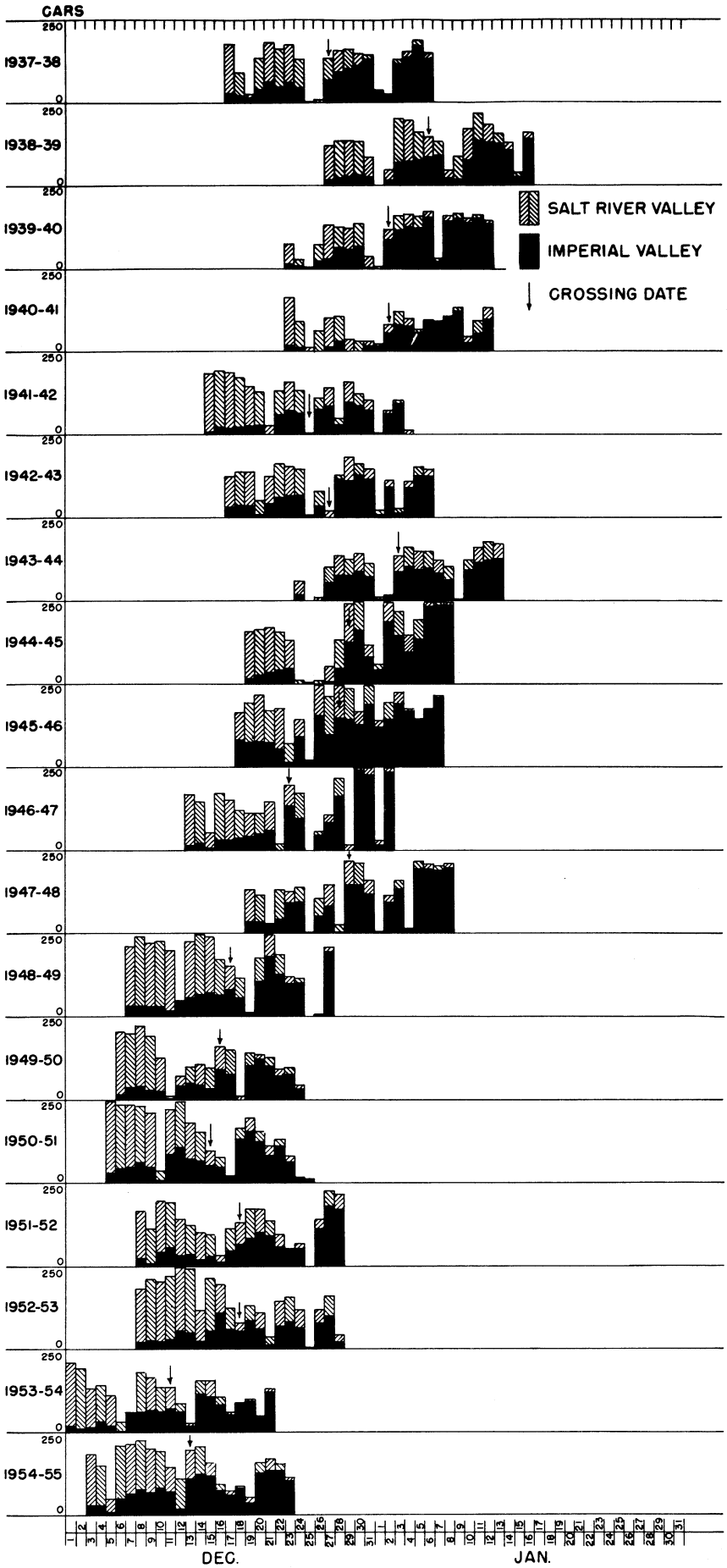


Figure 16. – Crossing dates and carlot shipments of lettuce, Salt River Valley (fall) and Imperial Imperial Valley deals 1937-38 through 1954-55

the Spring deal in the Salt River district appears to be subject to more competition than the Fall deal.

Crossing Dates

The most important crossing date for the Salt River Spring lettuce deal again involves the Salinas district (Figure 8). The Salt River district has made little advance in moving the crossing date forward into the Spring. The extreme years, 1937 and 1954, show that the date moved very little. Even though Salt River shipments have grown in April and May, Salinas shipments have also grown.

Again, it is difficult to determine where the casual emphasis should be placed relative to the shift of the Salt River Spring deal. Was this deal "pushed" out of March, or did producers and shippers prefer a later deal for other purposes? In light of the keen competition from the Yuma and Blythe districts, it is more reasonable to assume that competitive factors formed the principal basis for the shift.

The crossing dates of Salt River-Yuma and Salt River-Imperial daily shipments for the years 1937-54 are shown in Figures 17 and 18. There have been large fluctuations in these dates, but the tendency has been for the "peaks", or early crossing dates, to grow smaller and smaller. The crossing date moved at the average rate of about 1 1/2 days per year in each case. Indeed, crossing dates during late March and early April seem unrepresentative and may have been responsible for the small amount of trend that exists in these dates. Much will depend on the relative strength of the three districts, particularly Yuma and Salt River, in this season, and their strength compared to the new development in the Blythe district of Southern California.

Intensity of Competition

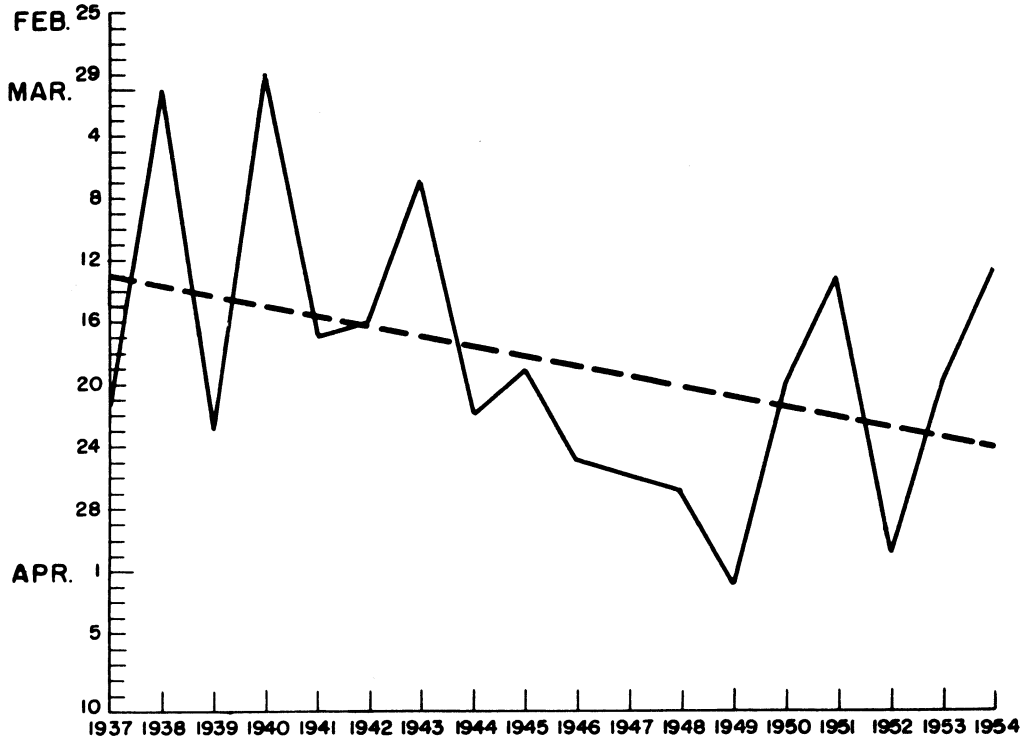
The daily shipment data around the Salt River-Salinas Spring crossing dates showed no abnormal increase in the volume of shipments around these dates (Figure 12). On the basis of volume only, there would seem to be no increase in competition around the crossing dates.

The other important competitors in the Spring deal with Salt River district are Yuma, Imperial, and Southern California. Figures 19 and 20 show the daily shipment data around the crossing dates for the Spring deal in the Salt River district with respect to the deals in Yuma and Imperial.

The various fluctuations during the overlap between the Salt River and Yuma districts at this time are more significant because of the nature and timing of the deals. In Figure 19, Salt River is pictured coming in and Yuma as going out, but the fact is that during many years they were quite equally balanced during the overlap period. The 1953 deal provides a good illustration of this phenomenon.

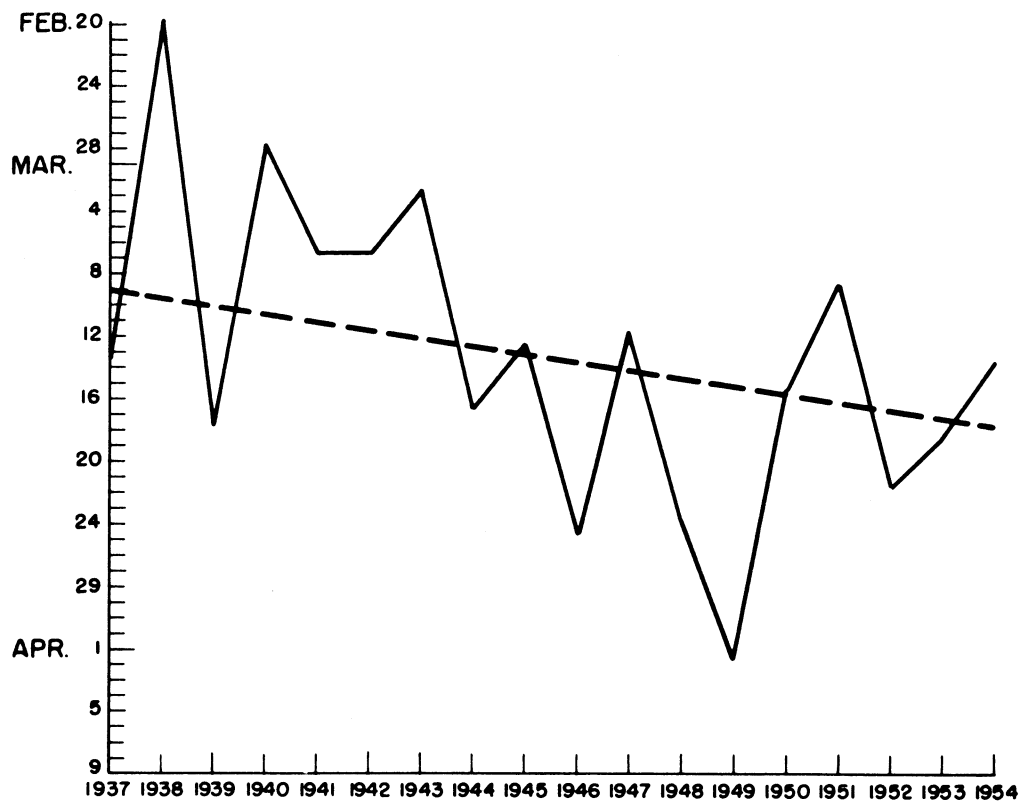
A study of the Salt River-Imperial combination will reveal a fluctuating shipment situation over the entire period 1937-54 (Figure 20). Also, shipments fluctuated within particular years; for example, the immediate post-war years when shipments from the Salt River district were more dominant than at other times. As has already been seen, there have been wide annual fluctuations with respect to the crossing date. As would be expected, the earlier the crossing date, the more important are the Imperial shipments, and vice versa.

The statistical measure used (see page 21) led to the conclusion that no extraordinary degree of competition existed around the crossing dates for the three areas in question. As for the Southern California district, data are insufficient as yet to lead to valid conclusions based on experience, but there is little doubt that this area is offering serious competition to the Yuma and Salt River district during the overlap period.



CROSSING DATES BETWEEN YUMA & SALT RIVER VALLEY (SPRING DEAL)
1937-1954

Figure 17.



CROSSING DATES FOR IMPERIAL VALLEY & SALT RIVER VALLEY (SPRING DEAL)
1937-1954

Figure 18.

The Imperial District

The Imperial Valley is the most important Winter lettuce producing and shipping area in the United States. This district, along with the Yuma and Texas areas, ships almost 100 per cent of the commercial lettuce crop during January and February. These areas are completely dominant during the three-month period from mid-December to mid-March. The Imperial district itself ships about 70 per cent of all lettuce during January and February and has recently pushed more heavily into the mid-December period. Average total shipments for the deal were 13,120 cars during the second period and 7,768 cars in the first period, an increase of 68.9 per cent. Shipments increased on the average of 228 cars per week between the two periods 6/ (Table 5).

The most striking aspect of these figures is the over-all growth of lettuce shipments. The Imperial district grew at a faster rate than any of the major districts during the time covered by this study. Figure 4 shows that this growth came in two stages, the largest of which was during February. During 10 of the 14 weeks from mid-December to mid-March, this deal grew at the amazing rate of over 300 cars per week. This high rate of expansion came about primarily because of the increased demand for Winter lettuce, but there was some growth at the expense of other areas.

Contrary to what happened in other major deals, at no time was there an absolute decline in lettuce shipments from the Imperial district between the two periods under study.

Competition and Shifts

The "shifts" in the Imperial Valley lettuce-producing area have been mostly in the nature of growth. However, there has been a small shift in the seasonal peak. These phenomena, which are evident from the figures, are perhaps better illustrated by Table 5. This table shows Imperial gaining 17 per cent more of the lettuce market in December and 19 per cent more of the market in March between the periods under study. The district gained 6.5 per cent more of the market in February, but lost, relatively speaking, during January. This occurred even though the gain in shipments was sizeable. For example, there was an increase in shipments of more than a thousand cars out of the Imperial district during January between the two periods, but the share of total United States shipments decreased 4 per cent. Shipments continue to be negligible during the months other than those described.

Imperial's increased share of the market during December and March has come primarily at the expense of Salt River Valley lettuce producers. In the late Fall-early Winter period, the gains of Imperial and Yuma account for the largest share of the Salt River loss. The same is true of March. However, all of these areas have lost ground, relatively speaking, to Texas during January. Imperial made small gains during February, and the peak has shifted from the first to the second week in February.

There was a sharp decline of shipments during the week of January 17 in the second period (Figures 2 and 4, Tables 4 and 5). This occurred also in the Yuma district. It is believed that heavy Texas shipments during January, and this week in particular, are primarily responsible for the decrease in shipments from Imperial and Yuma.

The 1954-55 volume of approximately 13,000 cars from the Imperial Valley was below that of the past two years, but was about average for the post-war period.

Crossing Dates

Seasonal shifts have possibly been of less consequence in the Imperial Valley than in

6/ Only those weeks in which weekly carlot shipments exceeded 100 were included in calculating this increase in cars per week.

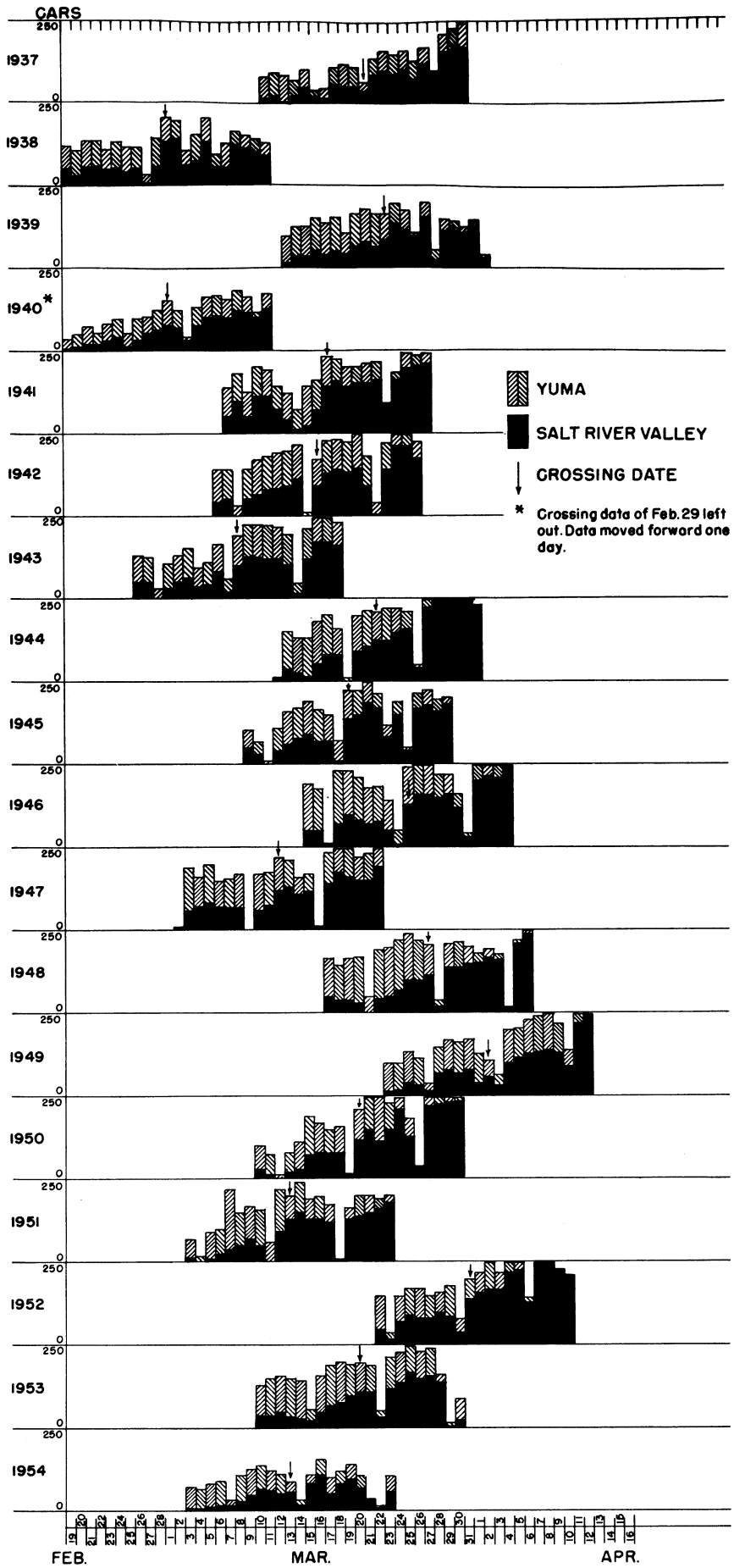


Figure 19.- Crossing dates and carlot shipments of lettuce, Yuma and Salt River Valley (spring) deals 1937-54.

any of the major districts. This can be seen by examining Figure 4, which compares the weekly shipments during the two time periods. The shifts in crossing dates from year to year have probably resulted largely from over-all growth.

It was pointed out in the discussion of the shifts in the Salinas district that Salinas had been pushed out of late November and early December, principally by the Salt River deal, and the Salinas-Imperial crossing date now occurs earlier (Figure 7). While this change in crossing dates is significant, the competitive nature of the two areas at this time is questionable, as will be brought out in the next section. The Salinas-Imperial crossing date moved from December 9 in the 1937-38 season to November 26 in the 1954-55 season, an average rate of about 1 1/2 days per year.

A more significant change occurred in the Imperial-Salt River (Fall deal) crossing date (Figure 14). The date moved from December 27 in the 1937-38 season to December 11 in the 1954-55 season, an average rate of 1 1/3 days per year. This shift in dates was at a rather smooth pace and almost paralleled the rate of shift of the Salt River district into November. As was pointed out in the analysis of the Salt River district, it is difficult to show a causal relationship in describing these shifts. That is, it is difficult to say whether the Imperial or the Salt River district was primarily responsible for the shifts which saw the Salinas district almost completely pushed out of early December and November.

There have been large fluctuations in the crossing dates of the Imperial deal, as it is going out, and the Salt River and Yuma Spring deals (Figures 18 and 21). This is especially true of the Imperial-Salt River date. This, plus the fact that there was only a small trend shown, limits the use of these data. For example, the crossing dates of the Imperial and Salt River districts were March 14 in 1937 and again March 14 in 1954 with large fluctuations between.

In the case of the Imperial-Yuma crossing dates, the trend toward a later date in March may partially explain why the Imperial district has gained a greater share of the lettuce market in March. The crossing date moved from March 11 in 1937 to March 16 in 1954, but it can be seen from Figure 21 that an earlier date in March for the year 1937 would have been more representative. The rate of this shift was almost one day per year.

These crossing dates and the relative strength of the deals during early March in the Imperial, Yuma, and Salt River districts will depend to a large degree on the strength of the growing Blythe district of Southern California.

Intensity of Competition

Competition between the Imperial and the Salinas districts has never been of major proportions (Figure 11). Figures 16 and 20, which show the daily shipments around the crossing dates between the Imperial and Salt River deals for the late Fall-Winter and Spring deals, were presented in the analysis of the Salt River Valley. Shipments within years have fluctuated noticeably during the late Fall-Winter deal. The most noticeable characteristic of the Spring data for the two areas is the over-all growth of the combined shipments. However, the fluctuations in shipments and crossing dates limit their significance and use.

One of the most notable characteristics about the Imperial-Yuma combination is that in most years both areas were almost equally strong for the three-week period covered. This seems to have been more true of the earlier years (Figure 22).

The data on comparison of daily shipments during the "crossing date week" with the "week after" and "week before" showed no evidence that competition was keener around the crossing dates for any of the major districts when compared to Imperial.

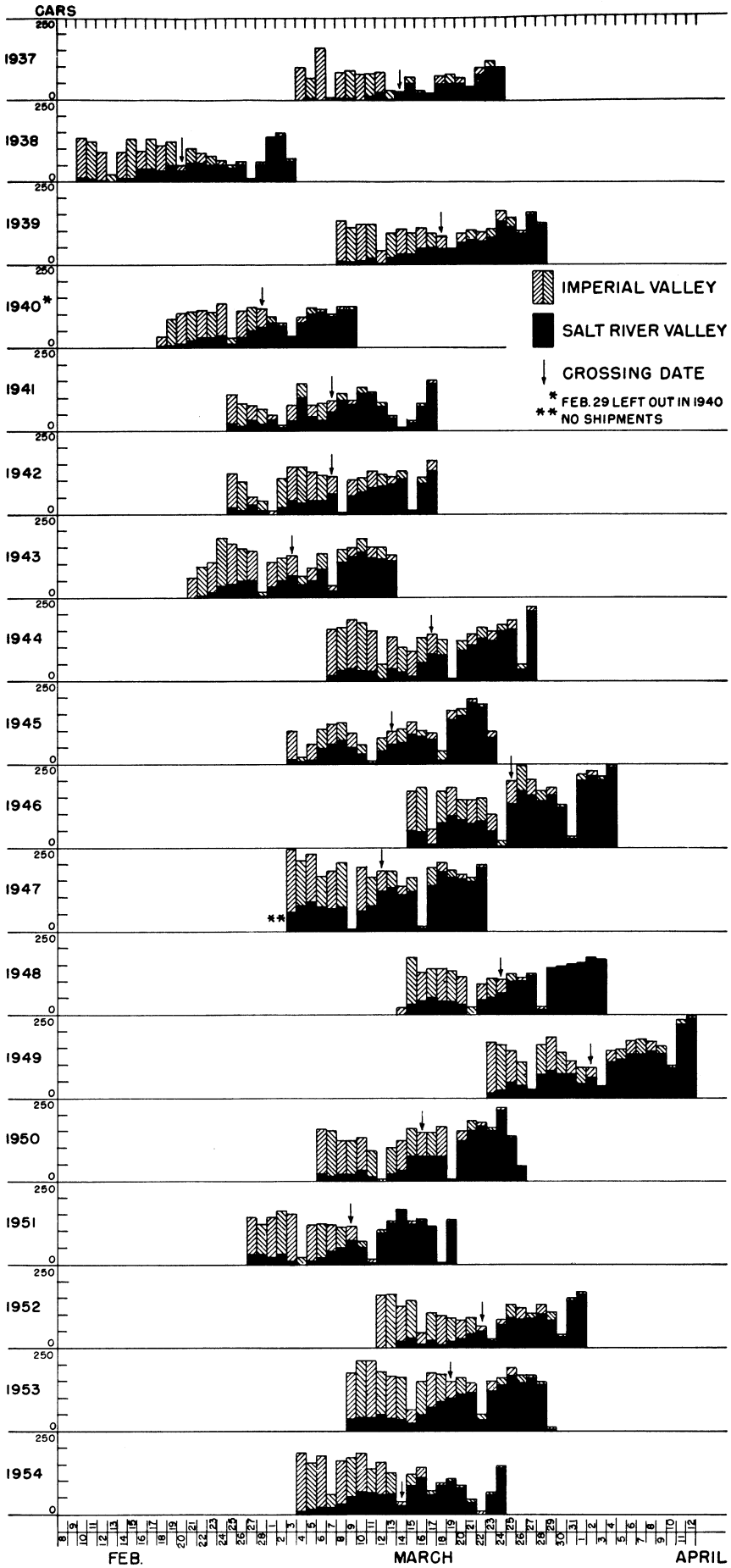


Figure 20.— Crossing dates and carlot shipments of lettuce, Salt River Valley (spring) and Imperial Valley deals 1937-1954

The Yuma District

The lettuce season in the Yuma district is characterized by the fact that it continues for a longer period than any of the four largest deals, except Salinas. During recent years, the Yuma deal has averaged from 200 to 500 cars of lettuce per week from late November through early April (Table 5). Shipments during most of this period, however, ranged from 200 to 300 cars per week. In the past, the extended length of this shipping period has proven to be an advantage in that facilities can be utilized more fully.

The Yuma deal is also the most recently developed of the four largest lettuce districts. This deal developed into a major lettuce shipping area during the middle nineteen thirties and has occupied a prominent place in the late Fall-Winter and early Spring periods ever since. However, in terms of volume, Yuma remains the smallest of the four largest deals.

Average shipments for the entire deal were 5,750 cars in the second period and 3,897 cars in the first period, a 47.5 per cent increase. Shipments increased on the average of 60 cars per week between the two periods 7/ (Table 3).

Lettuce shipments increased in the Yuma district between the two periods during every week except one (Figure 4). During recent years a new "peak" has become apparent in this district around the first week in December. This peak is not a shift of the peak which came in the first week in January during the first period, but is primarily growth. In fact, shipments increased during the first week of January between the two periods. Substantial gains were displayed in the Yuma district during January and March.

Competition and Shifts

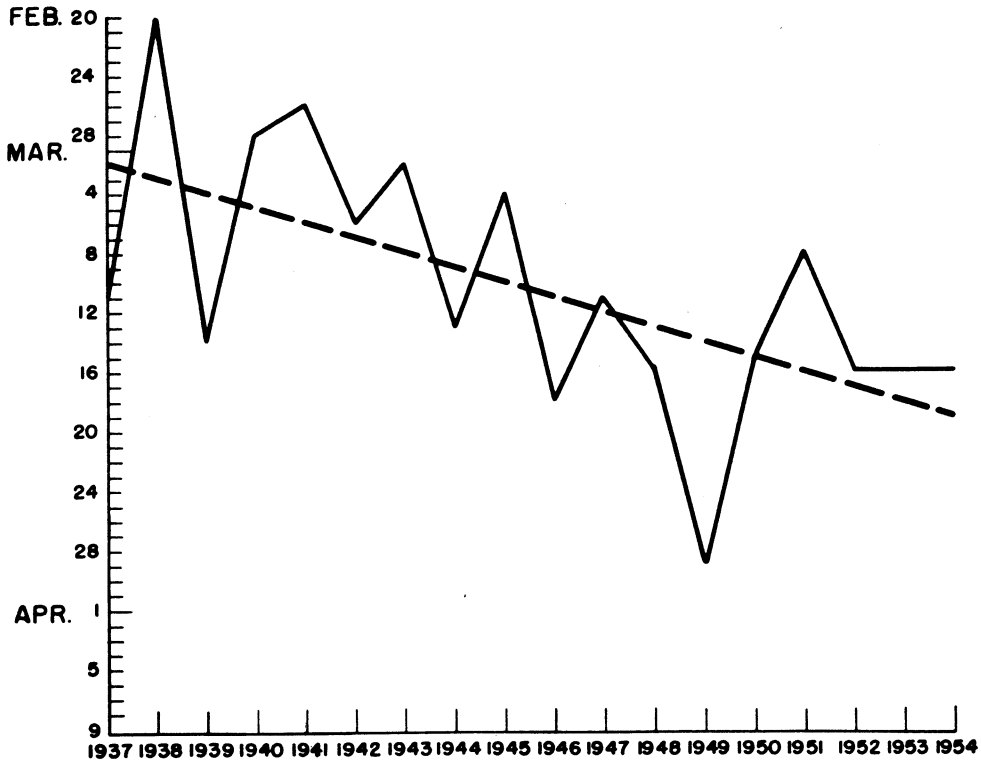
As was pointed out, one of the most noticeable aspects of the Yuma district has been the growth in the late Fall-early Winter season. Shipments from the district during the month of November in the second period averaged 178 cars as compared to only 3 cars in the first period, and in December, 1221 cars in the later period as compared to only 530 cars in the first period.

Although Yuma has gained a larger relative share of the market in November and December, it has lost some of that market in January and February (Table 5). The district has about held its own in March. It shipped about 29 per cent of the United States average shipments during March of the recent period and about 28.5 per cent in the earlier period. There has been a slight gain in April shipments, but shipments of April lettuce from Yuma remain relatively unimportant.

It has already been pointed out that the gains and shifts of the Yuma and Salt River area combined have been largely responsible for the loss sustained by the Salinas area during November. It was further shown that the gains enjoyed by Yuma and Imperial during December were responsible for Salt River losses in that month. We see by Tables 4 and 5, and Figures 2 and 4 that all of the major districts, including Yuma, have lost ground in January to the Texas district. Yuma's over-all growth in shipments of 47.5 per cent between the two periods under study is smaller than the average growth.

Competition is keen during all the important weeks that Yuma ships lettuce. There is hardly a time when it is dominant or when it "sets the market." This is not to say that this area is not important in the lettuce market. But increasing competition from the new areas of Texas and Southern California added to that from the Salt River and Imperial districts will provide a test as to whether the Yuma district will maintain the moderate rate of growth shown over the past 15 to 20 years.

7/ Only those weeks in which weekly carlot shipments exceeded 100 were included in calculating this increase in cars per week.



CROSSING DATES BETWEEN IMPERIAL VALLEY & YUMA (SPRING)
1937-1954

Figure 21.

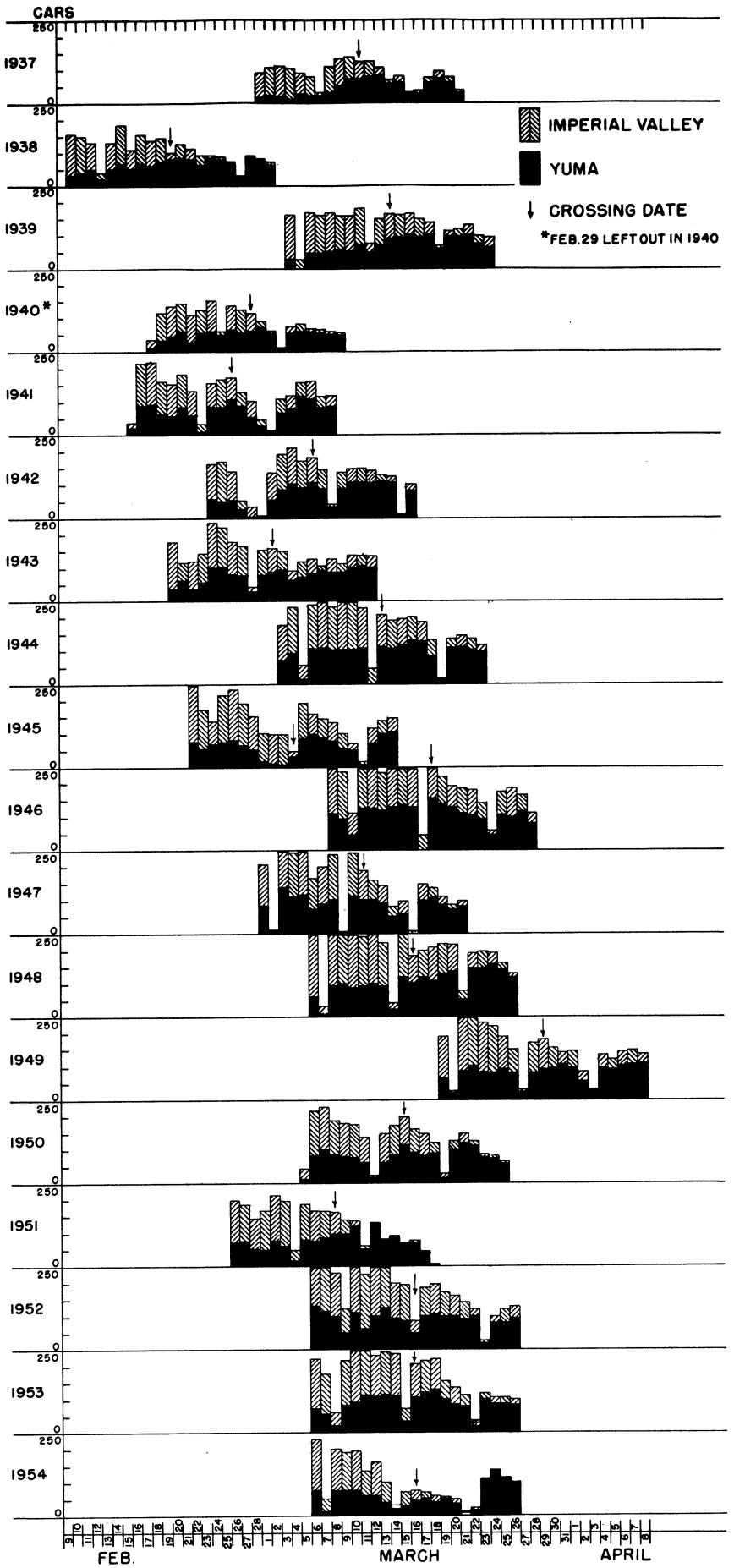


Figure 22.–Crossing dates and carlot shipments of lettuce, Yuma (spring) and Imperial Valley deals 1937-1954.

Crossing Dates

All of the crossing dates that involve Yuma and other major districts have already been presented in the other sections. However, they should be described here so that a concentrated appraisal may be given to them.

In regard to the most conspicuous shift involving the Yuma district, the crossing date of the Yuma-Salinas districts in the Fall has pushed into late November from December at a rate of about 1 1/2 days per year between 1937 and 1954 (Figure 6). At the same time, the Yuma-Salt River late Fall crossing date moved from late to middle December because the Salt River district had shifted away from heavy December shipments. This change came at the rate of about one day per year (Figure 13).

The questions most relevant to these gains and losses of the various districts during the late Fall-early Winter period concern causality. This problem has arisen in all the sections undertaken. There is no simple answer. Indeed, there has been a combination of factors responsible for this changing picture. There can be little doubt that Yuma and Imperial grew stronger in December, just as Salt River grew stronger in mid-November. In the former instance, pressure was put on the tail-end of the Salt River Fall deal; in the latter, it was put on Salinas. One of the most satisfactory answers seems to lie in the fact that in each instance shipments of new lettuce are taking over from a district which is cleaning up the remnants of its deal. While the principle of comparative advantage and relative costs limits this theory somewhat, demand and certain quality factors are apparently significant during these periods of overlapping. Lettuce buyers are certainly aware of the relative qualities of shipments from various areas at these times. Hence, it is a combination of supply, demand, and quality factors that has been responsible for these and other shifts in the industry.

The Yuma district is involved with the Salt River and Imperial districts in the late Winter-early Spring shipments. The trends of crossing dates in both instances are rather insignificant (Figures 17 and 21). Fluctuations are large, indicating that perhaps natural factors more than occasionally affect competitive relations. In the future, much will depend on competition from the Blythe district of Southern California.

Intensity of Competition

The Yuma district does not seriously compete with the Salinas district in any season (Figure 10). Most important are the competitive relationships between Yuma, Salt River and Imperial during February and March (Figures 19 and 22).

The Yuma-Imperial relationship is not so much a matter of one district pushing another out as it is a question of which district can last longer in the Spring. These areas are highly competitive throughout January and February. If Yuma lasts longer into the Spring, as it has generally been doing, the competitive relationship will shift accordingly. The equality of Spring shipments from these two areas around the crossing dates was shown above (Figure 22).

While the Yuma-Salt River competition is keen, it is not of the same nature as that between Yuma and Imperial. In this case, the Salt River Spring deal comes in quite rapidly. However, both the rapidity and the timing have been erratic over the years (Figure 21). Here again, the situation probably will be affected in the future by the relative strength of the Blythe district in Southern California.

The Texas Districts

Lettuce shipping on a large scale is a rather recent development in Texas. These districts are still not as important as the shipping areas in Salinas, Salt River Valley, Imperial, and Yuma, but increased shipments have been commanding more attention recently.

Shipments of lettuce from Texas originate in three general areas -- the Hereford district in the Panhandle, the district around Uvalde, and the lower Rio Grande Valley. The Hereford district ships in the Fall; the other districts, in late Fall and Winter.

There were no shipments of consequence during the period 1937-38 to 1941-42. Table 3 shows by weeks how Texas compares with other districts in shipments of lettuce during the second period. Table 5 shows its relative share of the market in seven months during the same period. Figures 2 and 4 present in graphic form the weekly and monthly data on lettuce shipments from Texas.

Approximately three-fourths of the lettuce is shipped from Texas during October, December, and January. The Hereford area comes in during late September, but is normally peaks around the third week in October. The Uvalde and lower Rio Grande Valley areas normally come in about mid-December, hit their peak in mid-January, and run through the first two weeks in February. Some shipments are made from the Rio Grande Valley in March and early April (Figure 23).

Rail shipments from Texas seldom run over 200 cars per week. The period during which competition is most keenly felt by the major districts comes during January. In the period 1949-50 to 1953-54, Texas averaged 12 per cent of all January shipments. It has already been noted that all of the larger districts have become relatively weaker in January (Figure 4). Texas shipments are a major factor in these losses and the resulting shifts. Texas shipped on the average of 10 per cent of the lettuce during October of the second period, but this did not seem to affect the market for Salinas lettuce.

Actually, the competition from Texas is much greater than these figures indicate because they measure only that portion of lettuce that is shipped by rail. It is estimated that about 50 per cent of all Texas lettuce is trucked. 8/ This means that instead of the average figure of about 3,000 cars, there would be perhaps 6,000 carlot equivalents of lettuce originating from these districts annually. Most of these truck shipments find their way into nearby markets in the South and Southwest. None reach the large terminal markets.

The major handicap facing the Texas lettuce districts is the weather. Conditions are not as certain as in the Arizona-California areas. However, production costs are lower in most instances, and the distance to markets is shorter. These factors, plus quality and new varieties, will determine whether Texas will offer increasing competition in the future.

The Blythe District of Southern California

The Southern California area includes all lettuce grown south of the Tehachapi Mountains in California, excluding the Imperial Valley. This includes some southern coastal areas of the state, certain inland valleys, and the Blythe district. A large portion of the lettuce grown in this general area is trucked to local markets in California and is not reflected in the shipment data. The principal district out of which lettuce has moved in competitive volumes is Blythe. It is this district with which we shall be concerned here.

The Blythe district shipped no lettuce of consequence during the 1937-38 to 1941-42 period (Table 3). Lettuce shipments from this area in the second period have formed two peaks, one in late November-early December, and one in March. These peaks correspond closely to the Salt River Valley peaks. Competition is most keenly felt in March (Table 5, Figure 24).

Average figures for the recent five-year period hardly reflect the growing importance of Southern California lettuce shipments. In order to show the fast growth of this area, data are plotted in Figure 25 for four recent crop years from 1949-50 to 1954-55. It is seen that

8/ This figure was quoted to the author by several of the major shippers in the Uvalde district.

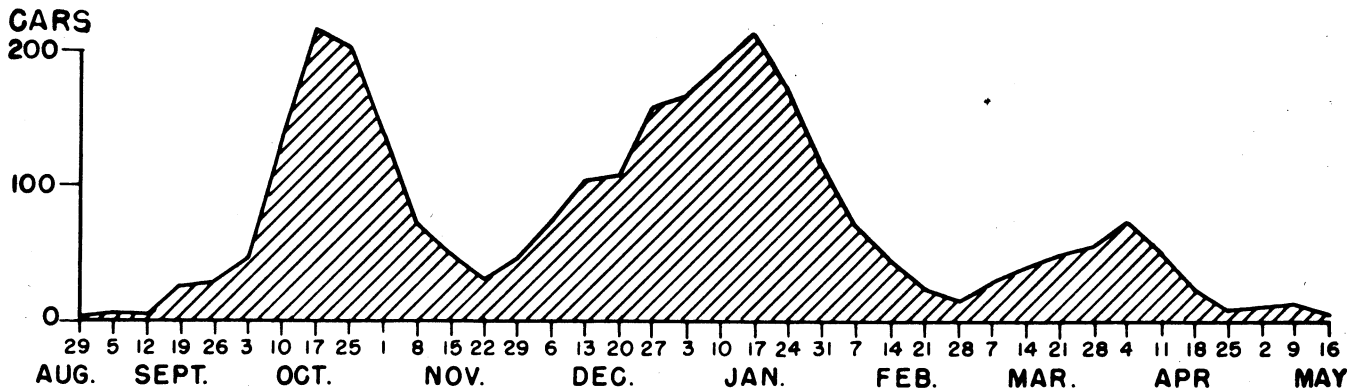


Figure 23.—Average weekly carlot shipments of lettuce, Texas, five-year period 1949-50 to 1953-54.

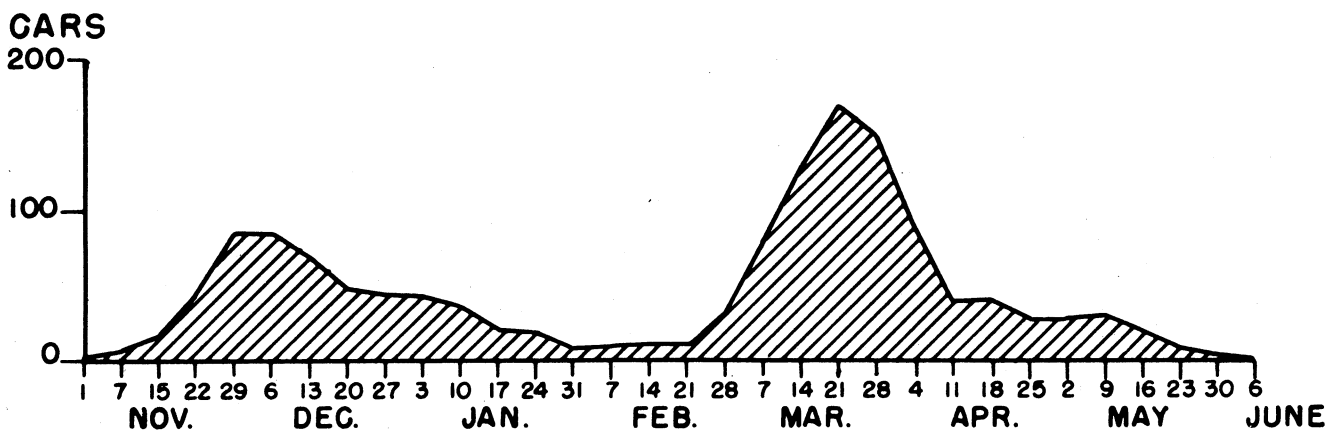


Figure 24.—Average weekly carlot shipments of lettuce, Southern California, five-year period 1949-50 to 1953-54.

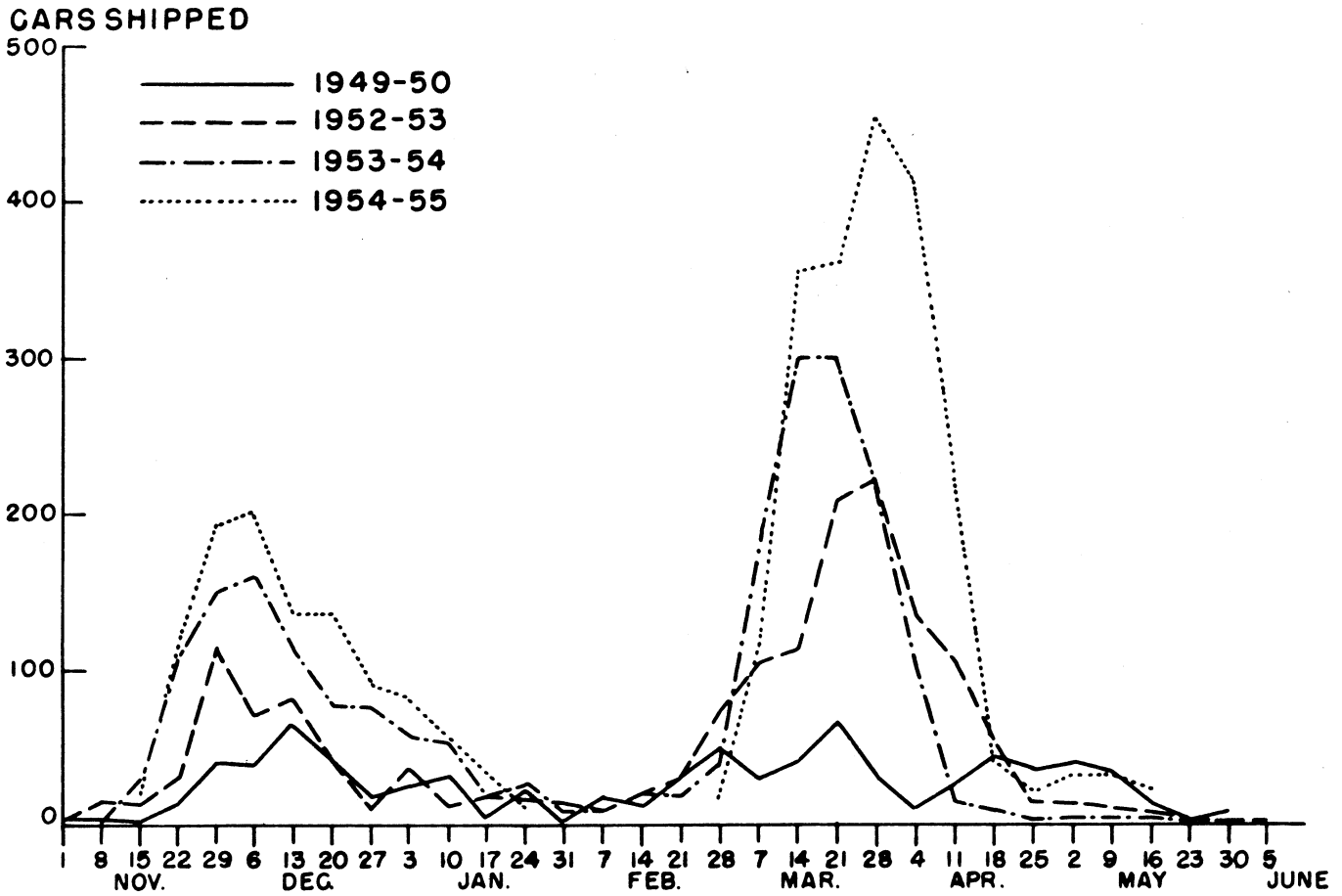


Figure 25.-Weekly carlot shipments of lettuce from the Southern California district, 1949-50, 1952-53, 1953-54 and 1954-55.

in each succeeding year during the recent time period, the peaks have grown higher and higher.

On the average, this area accounted for 4.6 per cent of total United States lettuce shipments in December of the second period, and 7.6 per cent in March of the same period. But during the 1954-55 season, 9.7 per cent of total United States lettuce shipments originated in Southern California in December, and 16.7 per cent in March. During the week including March 28 of 1954-55, over 450 cars of lettuce were shipped. For this single week, this represented an unprecedented 25.7 per cent of United States shipments. Other statistics could be cited to bear out the fact that this district is of growing importance.

The question is, which districts are most directly affected by shipments from the Blythe area? This is not difficult to answer if one observes the over-all picture presented by Figure 4. A heavy line was drawn through the peak of the Southern California district in order to point out this fact. It is seen that Yuma and the Salt River Valley are most seriously affected while Salinas is affected slightly. Yuma is being "squeezed" by the Imperial and the Salt River districts as well as by Blythe. The Blythe district is affecting Yuma shipments seriously because peak shipments from the two areas during the early Spring season almost coincide. Blythe is affecting Salt River seriously in that it is "pushing" the latter toward a later Spring date, at which time shipments from Salinas begin on a large scale. Hence, we see that the Blythe district will probably continue to put pressure on other districts during March and early April. In the last two weeks of March of the early Spring deal of 1955, for example, this area almost "set the market."

One reason for this growth has been a plentiful water supply at a reasonable price. Transportation is adequate, and there is land available for expansion. There is reason to believe that the Blythe district will continue to grow in importance in the immediate future.